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East Europe Report

ECONOMIC AND INDUSTRIAL AFFAIRS

No. 2003

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MINISTER LER EXPLAINS SIGNIFICANCE OF IMPROVEMENT MEASURES

Prague HOSPODARSKE NOVINY in Czech 14 Mar 80 pp 1, 4, 5

[Article by Eng Leopold Ler, candidatus scientiae, CSSR Minister of Finance and chairman of the government committee for questions on the planned management of the national economy: "An Important Step in the Process of Improving Planned Management"]

[Text] The presidium of the Central Committee of the Communist Party of Czechoslovakia and the CSSR Government have discussed, as one element of the preparations for the Seventh Five-Year Plan, a system of measures to improve the planned management of the national economy after 1980, and have adopted a resolution implementing these measures which must be fulfilled by every party, social, federal and economic organ. At the same time, the results achieved in economic development since the 15th congress of the CPCZ were evaluated and the correctness of the strategic line of the 15th congress, namely to orient our efforts primarily at achieving effectiveness and quality in every type of work, was confirmed. The system of measures is completely consistent with the directive of the CPCZ 15th congress that states: "In improving the system of planned management during the Sixth Five-Year Plan we shall retain and develop everything that has proved itself in practice. At the same time, we shall test and introduce new elements, especially in those cases where previous instruments have not proved adequate in implementing our economic policy."

During the Sixth Five-Year Plan there were a number of specific adjustments drafted and executed within the management system that were intended chiefly to increase the importance of the quality indicators in planning and in accessing the merits of enterprises, to improve the planning of targets in science and technology, to increase material self-interest in the results achieved in export, to create the preconditions for the more efficient planned management of material relations, etc. All these changes contributed to the economic sphere's beginning to orient itself to a greater extent than previously toward the qualitative aspect of the development of the economy.

The Program Basis for the Further Development of the Economy

An essential step toward fulfilling the conclusions of the CPCZ 15th congress in the area of improving planned management was taken with the carrying out of a complex experiment in managerial effectiveness and quality begun in 1978 in 12 VHJ's [economic production units] with nearly half a million workers. The modified theses of the experiment have been in effect since 1979 in an additional five VHJ's in the food-processing industry and construction. Several dozen new systemic changes aimed primarily at the quality aspect of the reproduction process were fashioned into the principles of the complex experiment. The experimental verification was able to let us know somewhat in advance what kind of measures have to be taken in practice in order that emphasis on foresightedness, final results, effectiveness and quality be manifested in practice as a change in the thinking and activity of managerial workers, so that they will be able to cope with the challenges that must be met to insure our economy's continued development.

The experience gained from the 2 years spent carrying out the complex experiment indicates that the changes made in management principles have an essentially positive effect and influence the thinking and actions of managerial workers in the desired direction, toward improving effectiveness and quality. For this reason the majority of elements contained in the experiment were made applicable to the entire national economy in the system of measures announced above. Along with the information obtained from the complex experiment, all previous elements and instruments of management whose lasting economic effectiveness had been proved by rigorous analysis were utilized in drafting the system of measures. Work on drafting the measures also drew on the experience of other socialist countries. Especially valuable is the resolution of the CPCZ Central Committee and the USSR Council of Ministers on improving planning and strengthening the influence of the economic mechanism on increasing the effectiveness of production and the quality of work. It can be stated that the basic course and a number of the specific measures on improving the management system in this country are similar to measures adopted in the USSR.

Implementing the system of measures must be accomplished with the idea in mind that in the final analysis it is a matter of changing ways of thinking, of changing how leading workers operate to insure the intensive development of our economy. What is involved is not just changing some indicators or regulations, then, but the adaptation of the managerial sphere to the idea that the entire reproductive process must be carried out with appreciably better results in effectiveness than hitherto, particularly with regards to the valorization of raw materials, materials, and energy consumed.

The system of measures does not exist in a vacuum with no purpose beyond its own existence. Its effectuation, carried out differentially according to the nature of the sector and level of management, must always be linked to the decision of substantive problems. At the present time it is important to insure completely the targets for the 1980 plan and prepare the Seventh Five-Year Plan well. Implementing the system of measures must be used as an effective means toward this end.

The system of measures is not to be understood as a cure-all, on the one hand, following whose "taking" all ills will disappear and everything will go smoothly. It is merely that better conditions will be created for concrete management. It would likewise be a mistake to underrate the system of measures, not to regard it as a genuine attempt to improve planned management in connection with the need to achieve higher effectiveness and quality. On the other hand, we should in no way be intimidated by the thought of possible conflicts that implementing the system of measures will give rise to in cases where these will mean combating inferior work, laziness, wastefulness, and ineffectiveness.

The system of measures is to be understood as a program. To be sure, the basic provisions will take force on 1 January 1981, but a number of important measures will go into effect in stages. For a number of areas it must be considered whether the solutions offered for them in the system of measures are exhaustive and [whether we ought] to seek out conclusions of greater effectiveness. The resolution of some of the fundamental problems will be experimentally verified in the course of the Seventh Five-Year Plan.

This all contributes to making the system of measures a document that will be gradually enriched by the collective experience of party organs, government and economic organs and organizations, trade unions and others. This idea is also confirmed by the fact that the system of measures is not just a methodological precept, but contains quite specific targets for the competent organs and the entire management axis.

In studying the system of measures and in implementing them the thought is bound to arise as to whether this will result in a decrease or an increase in [the amount of] administration. The authorized central organs were directed to strive for simplification in drafting the legal regulations. In the final ratification of the relevant provisions it will therefore be necessary to demonstrate how demanding they will be in terms of administration.

A key goal of the system of measures is thus overall effectiveness in conserving such basic factors of production as raw materials, materials, energy, manpower and fixed assets.

I would like to present individually those new elements and changes that demand particular attention in implementation because of their decisive importance.

Improving the Quality of Planning Is a Primary Precondition

Emphasis on improving the quality of planning at all levels is insured by strengthening its scientific nature, its orientation toward the future, its complex character, and its interrelatedness. In the interest of realizing the basic objectives of the major structural and quality changes in the economy, long-term projects are receiving more emphasis. These projects take as a point of departure the participation of the CSSR in long-term goal programs of economic cooperation with CEMA countries and in international specialization and cooperation projects, especially with the Soviet Union. Both scientific workplaces, which will attempt to predict the basic directions scientific and technological progress will take in the CSSR and abroad, as well as the central organs and the relevant VHJ's, which will have as goals working out solutions to problems specific to the sector, will be involved in these projects. The basic form of implementing the goal-program approach in planning will be long-term comprehensive programs which will be formulated within the framework of the long-term prospects. These programs will set forth in the necessary connections the basic macroeconomic qualitative changes in economic and social development. They will be based primarily on putting the results of scientific and technological development into practice and on the intensive and effective linking up of the CSSR economy with the international socialist economic integrated system.

An exceptionally important target is increasing the role of five-year plans as the most important means for realizing the economic and social policies of the party. The five-year plan will establish the major goals, limits and economic conditions for each year of the five-year plan. This should serve to eliminate any kind of short-term approach to management and to overcome the existing practice of establishing targets by using year-to-year indices of development of particular indicators based on the previous year's results. This frequently led to enforcing low plan targets, holding back reserves in the growth of production and effectiveness and at times even to unrational expenditures of funds allocated for the given year.

Within the framework of preparations for the five-year plan there are being worked out state goal programs that will represent fundamental structural changes in the economy and that will be oriented toward the key targets of scientific and technological development and the actions approved in conjunction with international socialist integration, toward the rational conservation of material resources, toward increasing the export capacity of the economy and so forth. These have already been prepared for the Seventh Five-Year Plan, and the scope of goal programs is appreciably narrower than has been the case in the past.

The essential function of the annual plans is to work out in detail and to insure the completion of the goals and targets of the five-year plan. The annual plans must at the same time respond operationally to changing foreign and domestic conditions, to new phenomena and needs arising in the course of fulfilling the five-year plan. Conditions allowing for an appropriate response to new demands must be created within the economy. This pertains above all to increasing the export capability of our economy, the continuous provision of the desired selection of goods, rapid delivery, the introduction of new goods, etc.

The correlations between the targets and the instruments of material stimulation established by the five-year plan for a given year are devised in such a way that it is advantageous to adopt higher targets, especially with respect to quality, in the annual plan, in other words, so that deviations from the five-year plan targets are penalized. Establishing this correlation must lead to a greater degree of material self-interest and to a change in the attitudes of collectives and individuals toward adopting progressive annual plans of VHJ's and enterprises, toward fulfilling and toward the socially goal-oriented exceeding of planned targets. Thus, better conditions will be created for counter-planning, one of the key forms of worker participation in drawing up the plan, and the conditions for the development of socialist competition and the conclusion of socialist obligations will be concretized. In connection with these measures, the directive for drawing up annual plans in its previous sense is depensed with.

It is especially urgent that the measures on improving the planning, management and organization of material relations in the national economy be put into practice. The material balancing of resources and requirements must be intensified at the level of the central planning organs, the ministries and VHJ's, and by the broader application of "gesce" [Management System by Centralized Coordination] increase the responsibility of supplier central organs, VHJ's and enterprises for satisfying the needs of society. The role of the balance method, in addition to its function of integrating the plan more completely and of allocating material resources, must also serve as a means of determining future needs, that is, as a means of actively insuring harmony between the evolution of resources and requirements.

The number of material balances is rising to 343 in the federal plan for the Seventh Five-Year Plan, principally in engineering; at the central organ level, balancing is being introduced for 120 products and in VHJ's for 230 products. Thus in the state plan more than half of industrial production is under the balance method. The measures also improve the aggregate balancing of sales by having the target for deliveries for productive and other consumption also stipulated in the plan in addition to targets for deliveries for finished national-economic requirements.

Cooperation between supplier and consumer organs in drafting and carrying out plans must be definitely improved. Long-term agreements will be concluded between VHJ's and enterprises that will be based on the five-year plan targets, and the binding force of economic agreements and the responsibility for adhering to them will be greater. Breaking of contractual obligations and antisocial actions will be penalized by the imposition of sanctions.

Clarifying the tasks of the five-year plan and harmonizing this with the annual plans demands increasing its quality at every stage. The formulation of the five-year plan must start with an analysis of the factors influencing the development of the various qualitative aspects of the reproduction process, with an ellucidation of the premises of this development and their multifaceted elaboration and their provisions consistent with the requirement of a goal-program approach throughout the entire planning process. This is a goal that is all the more challenging in that it will be achieved under complex and unstable foreign economic circumstances. For this reason the need was emphasized at the 14th session of the CPCZ Central Committee for considerably improving the level of the organizational and managerial work of managers in developing the initiative and responsiblity of organizations, their managerial staffs and working collectives in preparing and carrying the Seventh Five-Year Plan.

Orienting the Plan Toward the Qualitative Aspects of the Reproduction Process

In order for it to be possible to express and evaluate the results of the work done by collectives and individuals according to their concrete contribution to society better than has been done in the past, the importance of indicators expressing targets with respect to increasing effectiveness, the technological level and quality of products, and the satisfaction of consumer demands has been increased. Plan fulfillment and results achieved by the VHJ's and enterprises can no longer be evaluated exclusively on the basis of gross output. For this reason the most important measure is the introduction of a net output indicator in the form of an indicator reflecting the production unit's own performance, which will represent total value added exclusive of material costs, expenses for purchased services and non-production costs.

This [value added] indicator will be used to regulate the development of the major portion of wage funds and at the same time to calculate the effectiveness and to express the quality goals of the plan, principally labor productivity. Substituting this indicator for indicators previously used as a basis for calculating wages, which also included materialized labor, primarily serves to increase pressure to conserve fuels, energy, raw materials and materials, and to to eliminate the possibility of speculative cooperation and the selection of product assortments with a high portion of material costs.

Using an indicator for net output demands an increase in responsibility in the attitude of the VHJ's and enterprises for satisfying consumer demand with respect to selection, for research and providing for these demands in the plan and its implementation. The political and professional maturity of managers, officials and the organs of the CPCZ and ROH [Revolutionary Trade-Union Movement] must guarantee that differences in the profitability of individual products will not lead to the speculative selection of product structure, or to eliminating from the production programs the VHJ's and enterprises products that are less profitable. In this connection an important role is played by measures in the area of supplier-consumer relations and the contract system that expands the balance method of material relations and strengthens the position of consumers. At the same time they deal with more gentle adjustments in wholesale prices, with improving the setting and consistent control of prices, with penalties for violating the principles of price setting, and with price stimulation that provides for economically sound distribution of profitability in prices.

The concept of effectiveness must be employed in the drafting and the realization of the plan at every level of management. Indicators with respect to effectiveness will be treated as decisive.

Quality parameters for the realization of research and development targets, price limits for new products, the growth of kilogram prices for exported products, etc., are being made more explicit. The formulation of such quality indicators as labor productivity, cost development, utilization of fixed assets, must be preceded by a thorough analysis of the factors affecting development. In so doing, it must be kept in mind that in the new measures it is not a matter of replacing one measure with another, but of changing the approach to decisionmaking, of making changes in economic thinking, where effectiveness and quality must serve as the point of departure.

As regards the quality of production and effective innovation of product structure, the system of measures anticipates on the one hand the mandatory planning of the portion of products of quality class 1, the portion of technologically advanced products, innovations and products of deluxe execution, and with setting prices for these. It also anticipates lowering the prices of technologically out-moded and inferior products, and further expanding the existing system of penalities for inferior production. It also calls for increasing the evaluation of products in terms of their technological level and quality.

Increasing the Influence of Science and Technology

In order to increase the effect of science and technology on economic development, a number of measures are realized in the system of planned management that are aimed primarily at managing the implementation procedures putting technological advances into practice. Primarily it is a matter of the plan for scientific and technological development becoming the axis of the national economic plan, of the plan for production and the plan for capital investment being its continuation and realization in the production and reproduction of fixed assets. This necessitates a more consistent application of the goal-planning principle in planning and throughout the entire management process. Plans of much better quality must be drawn up and executed for technological development, for improving the quality of products, for the introduction of new products, modern technology and for reducing material demands. The system of mandatory realization plans for the development of science and technology is being extended to department and branch targets as well. It will be necessary to institute comprehensive systems of quality management much more consistently and energetically.

With respect to the criterion of effectiveness it will be necessary to more consistently influence what tasks are solved in the scientific and technological base and to gear them primarily toward insuring economic goals, the increase of effectiveness of social production and also to evaluate the results of the work of the scientific and technological base according to these criteria.

Greater Effectiveness in the Reproduction of Fixed Assets

Measures in the area of the reproduction of fixed assets are aimed primarily at overcoming long-standing deficiences in our capital investment programs and in the entire process of the reproduction of fixed assest; they are oriented both toward improving the preparation of capital-investments programs, and toward the effective operation of khozraschot principles and instruments. The system of planning and financing capital investments clarifies the concepts of effectiveness and recovery of investment costs and is to eliminate "rationing" of investments on the basis of limits. The dependence of the realization of a significant part of capital investments programs on the generation of resources and on adherence to established technical and economic parameters and criteria is being increased.

In drawing up the plan and including construction projects in it the most demanding criteria will be employed, among which are primarily the realization of technological development, purchased licenses, the introduction of new technologies, the conservation of manpower and securing of manpower for new capacities, the conservation of fuels, energy, metals, the utilization of existing capacities, the efficiency of fixed assets, the increased effectiveness of foreign exchange, rapid return on funds invested, among others. Their own goal programs in the plan contribute to raising the technological level of new capital-investment projects, and provisions for them in planning and execution; construction projects for these purposes will be provided for more extensively in the state plan and on a priority basis, in terms of delivery capacities, engineering facilities and materials, including imports. In the plan and its execution modernization rapid-cost-recovery investments will be given preferential treatment.

The responsiblity of the central sector organs and VHJ's for the effectiveness of capital investment will be substantially increased. In the area of the planning and financing of capital-investment projects two basic categories of investments are distinguished. Key investments, projects specifically listed in the state plan (mandatory targets and projects reviewed centrally), will be financed from the investment fund, whose resources will be planned in the financial plan, particularly in the five-year plan in harmony with the investment plan. What are known as limited investments will be financed out of the development fund created by the standardized yields from profits, depreciation, and perhaps from other sources as well. It is a matter of increasing the economic pressure on the effectiveness of investments in spite of the current situation, in which the VHJ's and enterprises obtain financial resources almost automatically along with the plan limit. The portion of these two categories out of the total volume of investments will very greatly with the sector and with the VHJ, being determined by the nature of their activity and that of the capital investment. On an average, though, approximately half of the construction in the majority of sectors will be financed out of the development fund.

Limited investments can be realized on the basis of the five-year plan (where their extent must be provided for by the planned generation of resources) only under the condition that a development fund of corresponding size will be formed and while adhering to the technical and economic parameters and criteria established for the VHJ's in the five-year plan by the central sector organs. The mere creation of a development fund, however, will not give VHJ's and enterprises the right to invest, in no case will there be investment just because the money is there. For VHJ's there will be established further criteria, for example, limits to the number of projects begun, the portion of modernization, of campaigns, the scope of utilization of basic resources, convertability. These measures should lead to VHJ's providing for effectiveness and the comprehensive provision of material and financial resources beginning with the planning stage. These measures should lead to the VHJ's providing for capital-investment projects in the plan itself according to the standpoints and criteria of effectiveness, and the comprehensive provision of material and financial resources. Such investment programs must be one of the basic forms of improving the quality of managing their development.

The system of measures in the area of the reproduction of fixed assets contains a number of other measures in the system of regulations concerning capital investment, on stimulating a shortening of construction periods and decreasing construction costs, on clarifying the objective principle of charging for and paying for investment work and deliveries. The measures taken as a whole must lead to a change in the previous approach of the VHJ's and enterprises toward the rational utilization of fixed assets, to a high degree of effectiveness, to rapid investment-cost recovery, and to a clear advantage to the entire society from cpaital-spending projects, inculcating an orientation toward modernization and renovation of the productive bases to the extent made possible by the size of the labor force.

Developing Khozraschot as a Method of Planned Management

Khozraschot, as a method of planned management and economic activity, will be developed as a unified system of economic relations between society and the economic units. At every level the relation of material responsibility between the economic sphere and society, between VHJ's and enterprises, and within enterprises will be strengthened. A more efficient utilization of khozraschot will be founded on targets, rules and norms established by the five-year plan.

The price, fiscal, credit and wage systems will be fashioned so as to create interest in and to exert economic pressure on reaching planned targets and achieving good results from cost-consciousness. The use of khozraschot must insure that all of the positive and negative results of the activities of the VHJ's and enterprises are reflected in their economic results, in their material incentives and in meeting their development needs.

The extent of the financial resources of individual organizations, and thus also the size of stimulation funds, will depend to a greater extent on fulfilling the quality indicators of their economic activity. In order to strengthen the responsibility of the VHJ's and enterprises for the results of their business dealings, the share of their own financial resources, in particular, profits, will be increased for financing planned needs and for forming stimulation funds. In comparison with the existing situation, the strengthening of khozraschot elements will show up most clearly in the area of capital-investment projects. There will be a substantial decrease in capital-investment subsidies from the federal budget; federal subsidies will be utilized only under the most exceptional circumstances as determined by the government of the CSSR. Increasing the share organizations will provide out of their own resources for financing their planned requirements means a planned increase in the pressure of the value instruments of management on the effectiveness of the creation of financial resources and strengthening the responsibility for their conservation and utilization. At the same time there will be a reduction in the portion of payments to the federal budget on profit earned.

Economic incentive funds will continue to be created dependent upon the meeting of the established conditional indicators and the making of utilizable profit. The possibility of creating this will be substantially affected by failure to fulfill the planned created of profit or by depleting the profits earned through fines, penalties, assessments for inferior production, etc. This principle for the creation of incentive funds will also be strengthened by an adjustment in the mandatory order of distributing profit earned.

The material stimulation on the growth of effective exports will be strengthened not only in terms of meeting the planned volume of exports, but primarily in terms of increasing foreign prices received. The system of measures to increase export efficiency is an important precondition for the continued development of our economy.

The targets of the foreign trade plan and the criteria for evaluating its effectiveness will be of decisive importance in the selection and orientation of the comprehensive development programs, for directing capital-investment projects and production, and for managing technological development and quality. The extent to which the indicators of the five-year plan are compulsory and the operation of financial-economic instruments of material incentives on the adoption and fulfillment of progressive targets in export are being expanded. It is anticipated that, particularly in connection with foreign price developments, the targets of the five-year plan for export will be updated as required by the annual plans.

The preconditions will be created both in the area of the management of the exchange instruments and in the area of the management of wholesale prices to create ever more demanding criteria for the effective integration of the enterprise sphere into the international division of labor and to make the views on the situation in foreign markets more realistic. In this line, the price mechanism will be gradually worked out in such a way that the prices of raw materials, fuels and materials, as well as those for imported machinery and equipment used in the reproduction process are consistent with their purchase costs. The influence of import price trends on the functioning of the enterprises and the VHJ's must lead to a more rational utilization of raw materials and investment resources than has been the case in the past.

Imported raw materials must be used to produce only technolgically advanced and high-quality products; raw materials must be valorized to the maximum for export. On the basis of export effectiveness achieved, profitability will be gradually differentiated in the wholesale prices of products in such a way that products that are unexportable because of low effectiveness are of minimal profitability, and conversely, so that products that are able to break through into more demanding markets with the hoped-for effectiveness are of above-average profitability.

The Economic Efficiency of Wages Is Increasing

Of key importance for the successful functioning of the system of planned management are the measures in the area of the creation of wage funds and bonuses. These measures are aimed at using more objective and more stringent yardsticks for assessing the merits and compensating collectives and individuals according to the concrete results of their work and the contribution this work makes to society.

The criteria for the creation of wage funds are being changed fundamentally. In the interest of creating a more direct dependence of the formation of wage funds on the increased effectiveness and quality of every type of work, as well as in the interest of exerting pressure to rationally economize on human labor, funds to be used for wages will be created in two component parts. The basic component of wages, which will represent some 80 percent of wage funds, will be formed according to value added; the size of the incentive component of wages will depend on the profitability of production funds or of production factors. This makes the criteria for determining the size of wage funds significantly more stringent.

By means of the value-added indicator the link between wage funds and the national income is insured for the entire national economy, putting pressure on individual links to increase the productivity of human labor and to improve the utilization of raw materials, materials and energy. An incentive for increasing overall effectiveness is created by using the profitability indicator as a criterion for the development of the incentive component of wage funds. Simultaneously, a greater sensitivity of the wage level to results achieved develops. While wages account for some 17 percent of the value of the output of goods produced, they amount to over 30 percent of value added.

In the past, the size of each year's wage funds was not established until the annual plan was drawn up. This practice often worked to the detriment of good collectives and to the benefit of lagging collectives, and thus weakened interest in rapidly mobilizing internal reserves. For the Seventh Five-Year Plan it is intended to establish the relation between the volume of wage funds and results achieved for the entire five-year period, the acceptance of higher targets in the plan being made more advantageous by using a smaller share (on the average, one-half) of the wage funds for above-plan results.

Results achieve will thus be reflected with significantly greater intensity in the creation of resources for bonuses. The stimulative effect of the instruments will thus intensify, but at the same time the demand made on correctly setting plan targets, on the quality of the price system and on responsibly economizing wage funds will grow. The dependence of wage funds on results achieved will thus have to be introduced down to the level of intra-enterprise units, an effective means of measuring their contribution to transforming the indicators of value added and profitability into criteria reflecting the share of each unit in increasing effectiveness and rationally economizing human labor.

A more consistent dependence of wage funds on results achieved must manifest itself in rewarding collectives and individuals as well. Superior organs will organizationally determine the compulsory orientation of indicators, in which they will give priority to indicators of personal incentive, quality and effectiveness. Indicators for personal incentive will be derived directly from the state plan targets and, in their aggregate, are to insure that the plan is fulfilled. In wage practice it is urgent that the differentiation of earnings based on the demands of the tasks and especially according to results achieved be enforced much more consistently. When targets are better fulfilled it will be possible to increase somewhat premiums and bonuses through wage regulations. Conversely, failure to meet targets will result in substantial material penalties being imposed for all classifications of workers. The annual premiums will be sharply reduced for managers having comprehensive responsibility for the results of VHJ's, enterprises, plants and intra-enterprise units.

The implementation of the measures on increasing the efficiency of the wage system should produce greater moral and material interest on the part of collectives in achieving a high degree of effectiveness and quality of work, an improvement in managerial work at all levels, the consistent resolution of problems in workshops, plants, enterprises and entire VHJ's. Its consequences will lead to greater differentiation in rewarding individuals according to their actual merits.

Goal-Orientation in Management

Economic processes tied to scientific and technological progress, specialization and cooperation processes in production, the urgent need to concentrate our efforts on key national-economic targets all demand a new division of jurisdiction and responsibilities in the managment of social production. Coping with challenging economic targets in the future assumes a considerable increase in the level of the work of the central administrative organs, both intersectorial and sectorial. Improvements in the quality of central national-economic management must be made primarily in developing its conceptual, coordinating and control functions, increasing its responsiblity for resolving key national-economic tasks, for scientific and technical progress and structural changes, for the high-quality drafting and execution of national-economic plans.

VHJ's will, in accordance with the conclusions of the CPCZ 15th congress, gradually be transformed into the basic units of management in the enterprise sphere, being provided with the necessary funds, powers and responsibilities. Directly related to this is the gradual rational reorganization of the production-technological base. At the general manager level it is necessary that the comprehensive approach to the solution of all fundamental questions of the development of the VHJ's with respect to the influence of production, technological, economic and social factors. The VHJ's will be completely responsible for developing a well-thought-out, goal-oriented technological, trade, investment and financial policy, for improving the management of the entire department, for creating the conditions allowing for greater enterprise initiative in discovering and mobilizing internal reserves.

The enterprise is and will remain an important managerial link within the newly conceived sphere of authority of the VHJ's. The enterprise is responsible for effective and high-quality production meeting the needs of customers and for the overall care and social development of the collective of workers.

To this is related the direct responsibility of the enterprise management for improving the quality and exportability of articles produced, for increases in effectiveness obtained by lowering costs, for the full utilization of fixed assets, for the rational economizing of manpower. The enterprise must likewise subordinate the development of intra-enterprise management to these goals.

A legal regulation will provide for the new position of the VHJ's as the basic administrative unit in all their forms. The complexity of the system of measures, under the conditions of the Seventh Five-Year plan, when some measures will be realized gradually and in close connection with the resolution of material problems of economic and social development, requires the creation of an efficient, internally consistent mechanism for the management process itself. This involves providing for coordinated precedures by state organs and the complex approach of economic organs at all levels of management. The complex approach of economic administration organs must be provided for by working out in detail and implementing complex programs for the development of management, which will be drafted by branch ministries, VHJ's, and enterprises by mid-1981. The programs for the development of management will solve the problem of the reorganization of the productive-technological and research bases, the organization of management, the utilization of computer technology, the unified operation of sociopolitical and economic stimulation in utilizing khozraschot. In view of the extent and the seriousness of the problems involved in the complex programs for developing management, efficient support from and control by political and social organs is necessary.

A basic ingredient in perfecting the planned management of the national economy is the continued intensification and improvement of the participation of workers in management. The initiative of workers in drafting the plan will be directed toward having all workers familiar with the targets of their work places come forward with suggestions on where to uncover reserves and seek out ways to make improvements, especially in the plan's quality targets. Counter-planning, based on the new position of the five-year plan, must play an important role here. In order to insure the realization of the plan, previous forms of worker participation in deciding on the key targets of the given organization will be perfected and intensified. Especially developed and improved will be the brigade of socialist labor movement, complex rationalization brigades, the improver-and-investor movement, individual and collective creators of engineering-technology, scientific and managerial workers, group socialist commitments, and other forms. Worker participation in assessing results will likewise be increased, and the role of collective contracts will also be enlarged.

With the increase in demands being made on the level of management and with the difficulty of the targets, requirements unavoidably increase for the high moral-political and professional quality of leading workers. From such workers at every level there will be demanded great commitment to their work, effective decisionmaking, the energetic resolution of problems and social responsibility for the overall fulfillment of tasks.

The Presidium of the CPCZ Central Committee and the government of the CSSR have emphasized that the stepwise drafting and introduction of the system of measures on improving the system of the planned management of the national economy after 1980 constitutes a very demanding, but nevertheless urgent and unpostponable task. Coping with this task will require prevailing over outdated views and methods, routine and inertia.

The system of measures constitutes a unifiedly conceived basis for the system of planned management of the national economy which must be differentially worked out in detail for the specific conditions of the different branches and sectors of the economy, while retaining and respecting the principles and overall orientation of the management system toward the strategic objectives of our economic policy. This is why a program for working out in detail and implementation was approved on the basis of which the competent intersectorial organs discussed with every ministry the specific execution of the system of measures, taking into account the characteristics of the particular sectors. For example, the problems relating to net output or added value will be different in power supply, transportation, and still different in engineering. By approximately the middle of this year, a small-scale model is to appear, on the basis of which the system of measures will receive its final form.

This will be the first step. In the future we shall have to devote enormous efforts to helping to introduce the specific measures into the thinking and actions of the people, to seeing that it is generally understood that what is involved is not just a change of indicators, a change in methodology, but new approaches, new ways of thinking in the daily managerial and organizational work of leading workers at every level. We are aware that the consistent enforcement of the system of measures in practice will not be sudden or problem-free.

Under the present complicated economic conditions it will be necessary, therefore, to guide and control the step-wise realization of the system of measures consistently, to link individual measures to the solution of the material tasks for the development of the national economy, to the specific circumstances of particular branches and departments.

The consistent and differentiated introduction of the measures in the VHJ's, enterprises and intra-enterprise units, to collectives and to every indivdual, is the most important prerequisite for their effective operation. This requires well-thought-out, qualified political-organizational work among people in party, but also in state, economic, trade-union and other social organizations.

The system of measures on improving the planned management of the national economy after 1980 forms an important component of the economic policy of the CPCZ. Under the leadership of the party we must insure a unified and coordinated advance by all organs and organizations, [and] responsible political and material preparation, so that the measures introduced will be an important contribution to insuring the further development of our socialist society.

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CONSTRUCTION ENGINEERING IN SEVENTH FIVE-YEAR PLAN DISCUSSED

Detailed Plans for Czech Republic

Prague HOSPODARSKE NOVINY in Czech 26 Feb 80 pp 8-9

[Article by Jan Hanetsleger, Deputy Minister of Construction, CSR: "Main Directions of the Development of Construction Machinery Industry in the Seventh Five-Year Plan"]

[Text] An increase in labor productivity in both branches of the construction industry--construction work and the building materials sector--depends increased mechanism of work and modernization of processes. This will also lead to an increase in the quantity of machinery and equipment per worker; between 1970 and 1980 it increased from a value of 45,000 korunas to 105,290 korunas per worker in the construction sector and from 252,100 korunas to 523,500 korunas in industrial production. In addition, fixed assets increased from 7.5 billion to 17.584 billion korunas in the construction sector and from 12.9 billion to 26.84 billion korunas in industrial production.

The share of machinery production and repair and maintenance work in the construction ministry and the percentage of workers (8.2 percent of the total) engaged in it indicate the importance of this activity, on which the smoothness of labor and production processes depends. The construction machinery industry is meeting the majority of the requirements of VHJ's [economic production units] in the ministry and is also providing major overhaul of construction machinery for other ministries, including those of Fuels and Power, Agriculture and Food, and Industry, and for local construction and other organizations engaged in agricultural and construction work.

An analysis by the Research Institute of Land Construction in Prague indicates that fixed capital is not being sufficiently renewed, obsolescence and depreciation of earth-working machinery exceed 60 percent, and as a consequence the emphasis is being placed on repair of heavy construction machinery, including rebuilding and production of spare parts. In the summaries drawn up by the 15th KSC Congress and the associated sessions of the KSC Central Committee, the main goals of the sector's development are based on effective conditions for modern industrial production, mobilizing in particular intensive, but also the necessary extensive, growth factors. HVJ Stavebni strojirenstvi a lehka prefabrikace [construction machinery and light prefabrication], with an annual capacity of 3.222 million korunas in the Czech Republic and 12,220 workers, remains a development area for the Seventh Five-Year Plan. The share of repair work in gross output is 36 percent.

The development of the construction machinery industry and the light prefabrication industry was decided on during 1977-1979 when the development programs for individual activities, including investment support, were drawn up. The main development programs are:

repair work and commercial technical services;
molding equipment and mechanical process equipment for panel factories;
light prefabrication for construction;
fittings production and electrical distribution panels;
machinery and equipment production;
higher supply functions.

The main goals of the development programs are described below.

Repair Work

On the basis of an assumed expansion of the machine inventory of the CSR Ministry of Construction and use of the construction machinery repair coefficient, the following requirements for repair work in the final years of successive five-year plans were determined: 1,360 million korunas in 1980, 1,847 million korunas in 1985, and 2,449 million korunas in 1990. Even though the rate of growth of major overhauls during the Seventh Five-Year Plan has an index of 136 percent, owing to problems of capacity it will be necessary to make fuller use of the categorization approach (selection of machines) until the system for gradual replacement of assemblies is more developed and innovation in the machine inventory is correspondingly supported.

The increasing proportion of machines with hydraulic working and control components already necessitates accelerated expansion of repair and rebuilding of such parts, which will be gradually separated off into specialized plants according to an organizational program that has been prepared.

Where repair technology is concerned, the development involves series production of spare parts, development of single-purpose machines and production lines and, in small-series production, grouped inroduction of NC [numerical control] machinery concentrated in a specialized plant.

A conspicuous feature of the development of the repair sector is increasing specialization of overhaul work with a countrywide range and a more thorough integration within CEMA, with the aim of mutual provision of overhaul of construction machinery and certain types of units, particularly in the GDR, Poland and Czechoslovakia, i.e. in the producing country, which has available all the equipment and process requisites for the production of spare parts and for overhaul.

The operability of extraction and transport equipment in the construction industry requires, in addition to the overall repair process, commercial technical services including:

comprehensive service extending to imported types of machinery, for which consignment depots will be built,

loans of special types of construction equipment, primarily for Prague and the North Bohemian Kraj,

commerical activity involving the construction of central spare parts and assemplies warehouses for scheduled parts replacement. Day-to-day management of these central spare parts warehouses by computer will decrease the financial resources tied up in the warehouses of organizations in the CSR Ministry of Contruction.

Molding Equipment

Prefabrication of buildings has attained considerable scope and has made it possible to carry out a demanding investment program of domestic and civil construction. Also needed are processes for industrial and engineering construction, to which structural changes in the building industry are now tending. A unified technical policy is directing the prefabrication program toward standardized types of construction and is further deepening installation processes, requiring a greater complexity and quality of components and structures. The further development and deepening of prefabrication is making heavy demands on molding equipment and mechanical process equipment in panel plants and mobile production facilities.

During the Sixth Five-Year Plan, a number of federal assignments in the development of science and technology will be completed, involving the introduction of new types of construction into domestic, civil, industrial and engineering construction. The accomplishment of the tasks will manifest itself in repeated production of mechanical equipment during the Seventh Five-Year Plan (P1.1 and P1.2 construction systems, new systems for rod-type components in the second and third categories of civil and industrial structures, prestressed bridge girders, collectors and components for the construction of nuclear power plants.

In spite of the fact that in 1980 the CSR will reach a molding equipment volume worth 60 million korunas, 4 times the 1975 level, and a mechanical process equipment output of 40 million korunas, 5 times the 1975 level, this will not be enough to meet the requirements of the construction industry at the beginning of the Seventh Five-Year Plan. The reason is, in particular, increased demand for modification of molding equipment as a result of the use of a new Czechoslovak State Standard which introduces greater thermal insulation of the external shells of buildings. Accordingly assistance from Hungary, East Germany and Poland is being discussed. VHJ Stavebni strojirenstvi a lehka prefabrikace's capacities for production of molding equipment in the Seventh Five-Year Plan are to reach the level of 200 million korunas by 1985.

An inseparable part of this development, however, is not only standardization and specialization of components, but also their economical production. It is essential to adhere to all the principles of efficient production and preparation for it which follow from the newest discoveries of science and technology and to cooperate further with the technical departments of the ministry and the VHJ's dealing with prefabrication in innovation plans, on standardization. The construction departments of institutes and enterprises must fôcus on decreasing the weight of structural members and equipment, decreasing energy and fuel consumption in manufacturing processes and the like.

In view of the increase in one-piece construction, particularly in construction for the fuel and power base, the limited carpentry capabilities, and the necessity of saving wood and decreasing labor consumption on construction projects, the molding equipment production program is expanding this year in the CSR with the production of standardized forms, including an additional production program for the NOE [expansion unknown] system previously supported by Hydrostav Bratislava national enterprise. An output volume of 5 million korunas is assumed already this year, and this is in the supporting and switching systems.

Light Construction Prefabrication

This production program, with a size of 730 million korunas, represents [illegible] percent of the gross output of the machinery production branch of the ministry. It is conducted by the national enterprises Kovona Karvina, Zavody lehky prefabrikace Boletice, Stavokonstrukce and Strojinvestav. The output level and assortment are governed by consumer demand and capacities and materials, and depend directly on the principles of the "Unified Technical Policy of the Construction Industry During the Seventh Five-Year Plan." This involves especially an increase in the share of civil, industrial and engineering construction with more supplying of parts in sets and with decreased labor consumption at the construction site.

The production of sanitary units is directly connected with the requirement for mass residential construction and the reconstruction of existing dwellings. The construction industry's requirements are met by existing capacities, by design and process innovation in domestic modules and sanitary units, by more use of sets of components, and by additional technical and organizational measures including an innovative process for light surface material for external and internal finishing, along with partitions, soffits and wall facings, as well as beams (subways, civil and industrial construction).

The balance of demand is influenced by specialization and division of labor at the VHJ level in the CSR and SSR, in ministerial organizations, interministerially and internationally. In production specialization, in addition to the locations of consumption and construction materials characteristics, account will be taken of requirements by area and transportation capabilities.

In view of the necessity of conserving fuel and energy, the program for expansion of light prefabrication in the area of external facing of buildings has been reduced in favor of silicate-base types (a layered concrete and ceramic skin and foamed concrete), which meets the revised requirements of Czechoslovak State Standard 73 05 40, even as regards heat accumulation by the more solid layers.

In the Seventh Five-Year Plan, this area is expected to grow with an average index of 1.3.

Fixtures Production

This production program, amounting to 560 million korunas, accounts for 21 percent of total output in the sector; it is carried on only by the Stavokonstrukce national enterprise in Prague and by Kovona Karvina. This sector includes standard metal construction fixtures specified in the catalogs for domestic, civil and industrial construction. They include windows, doors, gates, entrance walls, , railings, ladders, various construction accessories and standard components for puttyless glazing (WEMA), steel frames and the like. The increase by 1985 as compared to 1980 is expected to be at a rate of 1.29. Production of the required quality and assortment according to the needs of the construction industry will be assured from year to year by design and process innovations, whose purpose is essentially higher technical and operational parameters (surface finish, heat insulation category, higher functional reliability and the like). New processes will expand our series production of thin-walled shaped sections from galvanized strip using standard dies in the STAKO [expansion unknown] system. In addition, specialization will be considerably intensified, production will be concentrated and divison of labor will be increased both within the VHJ's and the ministry and between ministries.

This area also includes the production of standard distribution panels for domestic and civil construction and nonstandard distribution panels based on individual consumer requirements. Although the demand for standard distribution panels for dwelling construction is completely met, the demand for civil and industrial construction must be covered by further expansion of capacities. Within this assortment, the demand is increasing for products with more insulation, for special combination distribution panels for engineering uses, and for control panels for the use of Strojinvestav national enterprise, the general supplier of technology for our ministry's own capital construction. In the Seventh Five-Year Plan the output of distribution panels will increase at a rate of 1.6 to a level of 150 million korunas in 1985.

Machinery and Equipment Production

This program, amounting to 370 million korunas, accounts for roughly 12 percent of the total output of the sector; the main producer is Stavebni strojirenstvi Brno national enterprise. It includes the following:

machinery and equipment for panel plants other than molding equipment, reinforced concrete panels, cranes, hoists, belt conveyers and the like;

machinery and equipment for finishing work in construction;

machinery and equipment for the brick and ceramics industry;

machinery and equipment for the stone industry (equipment for extraction from water, classifiers, drilling machinery and the like).

The 1985/80 growth index is assumed to be 106.

The program aims at:

increasing our own output of single-purpose machinery and equipment which the engineering ministries are not producing and for which there are no other production sources in this country or CEMA. This involves direct shipments or subdeliveries for the Strojinvestav national enterprise;

development and production of machinery and equipment according to specialization agreements between CEMA countries;

specialization and co-production of machinery and equipment between the ministries of heavy and general engineering, fuels and power, agriculture and foods;

implementation of an innovation program for selected types of machinery and equipment.

Within this program, capacities for anticorrosion coating of steel components will expand. This involves an important technology for protecting materials, which also has promise for use in overhaul of machine components. In particular, this type of hot spraying will be used in the construction of hydraulic power production components and nuclear power stations.

Higher Supply Functions

The function of general supplier of equipment to meet the demands of our own departmental capital construction is assigned to Strojinvestav national enterprise. This is an important component in the construction of the ministry's material base, particularly in the areas of silicate prefabrication, the stone industry, brick production, and plants for extraction and refining of raw materials and the production of insulating materials.

The production base for our own deliveries of mechanical process equipment is formed within the framework of its production program by the relevant machine-building enterprises of VHJ Stavebny strojirenstvi a lehka prefabrikace. It installs machinery and equipment from other suppliers or carries out subsupply for investment in the Czech construction ministry.

An important task and prerequisite of proper operation of a general supplier is construction of its own planning and design capabilities so as to be able to provide design documentation itself for everything from the technical parts of the planning assignment to the working plans.

The ministry is devoting systematic attention to development of the construction machinery sector and is allocating its activity according to requirements. It is justifiably seen as a basis for increasing the productivity of the construction industry both in construction work and in the production of building materials. The construction machinery industry is satisfactorily supplying the construction industry with equipment and products not produced by the engineering ministries. However, both sectors are vitally dependent on deliveries of machinery, equipment and spare parts from the engineering industries. Rationalization of manufacturing processes by further automation and sufficient progressive instrumentation are the basis for further progress and a guarantee of improved labor productivity and quality, particularly in industrial production of building materials.

Methods of Improving Productivity

Prague HOSPODARSKE NOVINY in Slovak 26 Feb 80 pp 8-9

[Article by Eng Zdenek Nedobyty, Institute of Construction Economics and Organization, Bratislava: "Supply and Demand in Conflict"]

[Text] In the construction machinery and light prefabrication sectors, technical progress must play a decisive role in increasing output volume through 1990. Previous increases in labor productivity were the result of increases in fixed capital as a result of intensifying factors. During the Fourth and Fifth five-year plans, the increase in labor productivity was 50,000-80,000 korunas over the five-year plan, while in the Sixth and later five-year plans it must reach twice that level. These labor productivity growth rates as well as the growth in output required to satisfy the needs of the whole society, particularly in the repair sector, but also in new products for construction work and the building materials industry, require not only more extensive capital construction, but especially measures of a technical, technological and also economic character in the current production base.

For a number of years, capital construction in the production area of the construction machinery industry has not been commensurate with the construction industry's requirements. Moreover, especially in the repair sector capacities are also being used for specialized repair work outside the ministry. Thus demanding assignments and orders for repair and the production of spare parts, machinery and equipment for construction work and mechanical process equipment for the building materials industry have come into conflict with the capacities which are supposed to support them. The obsolescent production base is not capable of keeping step with technical progress in machinery production without suitable, effective and technically advanced capital construction. This indicates the inadequacy of previous investment development, and some figures from the past and the expected values for the Sixth Five-Year Plan will only confirm this, as shown in the table.

Table 1. Size of Investment and Investment Intensity

Datum/Indicator		Fifth Five-Year Plan			Sixth Five-Year Plan		
		SS	LP	SSLP	SS	LP	SSLP
Investment (million korunas)	CSR	249	237	486	225	220	445
	SSR	90	144	234	473	238	711
	CSSR	338	381	720	698	458	1158
Intensity of investment (percent of fixed capital in 1st year of 5th Five-Year Plan)	CSR	0.74	0.54	0.63	0.44	0.35	0.39
	SSR	0.46	1.07	0.71	1.76	0.98	1.39
	CSSR	0.64	0.67	0.66	0.90	0.53	0.70

(SS: construction machinery production;
LP: light prefabrication; SSLP: both)

The inadequate extent of investment development in the Sixth Five-Year Plan, particularly in the Czech Republic, which also extends back into the Fifth Five-Year Plan, is clear from the table. The intensity of investment is less than 0.50 and will have an unfavorable effect on depreciation of fixed machinery assets, which during the Sixth Five-Year Plan will increase by 53.5 percent in the construction machinery sector and by 45.3 percent in the light prefabrication sector. In the Slovak Republic, the preparation for investment development is more intense, leading to a decrease in depreciation by almost 30 percent. The Czech Republic's insufficient investment development in the Sixth Five-Year Plan will manifest itself in the fact that new construction will have a small share in output growth, as shown in Table 2.

This required increase in output will be difficult to meet without mobilizing internal potential in the production base, without at least a more fundamental renovation of the production base by investment plans amounting to about 2 million korunas, which would give effective assistance in assuring the increase in productivity required in the coming period. Accordingly, our expectation of the possible output volume in 1980 in the Czech Republic is about 500 million korunas lower than that being considered by the central organs. However, this will only aggravate the disproportion between requirements and their satisfaction.

Table 2. Share of Investment in Growth of Output

Indicator		Seventh Five-Year Plan			Sixth Five-Year Plan		
		SS	LP	SSLP	SS	LP	SSLP
Share of investment in growth of gross output value	CSR	84.4	83.2	84.3	68.9	78.2	73.3
	SSR	80.0	72 8	77.3	77.3	78.7	77.9
Intensity of investment (in terms of fixed capital in 1st year of five-year plan)	CSR			0.71			0.43
	SSR			0.32			0.40
	CSSR			0.54			0.41

How to Lessen the Disproportion?

We must bear in mind that the connections between technical progress and investment manifest themselves even at the lowest management levels, the enterprises, namely in the cooperation between the partners in capital construction: the investor, planner and supplier. This is where real effectiveness comes in; and it is affected by the quality of planning work and of the work of the builder or machinery supplier as well as the user of the construction. They both appear in the profit and profitability rate of the individual elements in the process. This effectiveness is frequently decreased by the lower organizational levels (indirectly) by stretching out construction schedules, increasing budget expenditures, failing to adhere to the planned parameters, overlong periods for startup of production and insufficient utilization of capacities and failure to renovate them early enough. An unfavorable phenomenon is prolongation of the performance cycle for capital construction. The average construction time is about 5 years, and in the Fifth Five-Year Plan steps were taken to decrease the amount of incomplete work, but it was not possible to shorten the construction schedules by 30-50 percent as called for by political and economic directives. We could cite another negative factor: an increase in budget expenditures in construction to more than 2 million korunas. In 1970-1973, the Slovak Ministry of Development and Technology found that the increase in budget expenditures was fully 30 percent. Meanwhile a considerable proportion of the capacities brought into the work did not meet the conditions in the plans. These factors develop mainly in the enterprises, from which later requests for a decrease in plan assignments come forth to the central organs. On this account the enterprises need increased attention as regards fixing the connections between technical progress and capital construction:

from the engineering design organizations, who are mainly concerned with considering more progressive parameters in comparison with those included in the investment plans, with saving budget expenditures with unchanged or higher design quality and with decreasing or replacing designs which require scarce resources;

from the investment organizations, which are concerned with determining optimal reproduction of fixed capital, with decreasing the time for startup of production and with maximum utilization of existing and renovated capital;

from the builders or equipment suppliers, who are concerned with technical and economic improvement of the parameters of the proposed project.

The Hope Lies in Stimulation

The above factors affect the average effectiveness of social production and the average profit and profitability rate of individual elements in social labor. These three relatively independent systems need to be united on the basis of joint efforts for maximum effectiveness of the whole of social production. The economic results indicate that we can use as economic indicators only those which are used at the national economic level, with emphasis on profit formation and the rate of decrease of material, capital and financial intensiveness of production. Only in exceptional cases might other indicators of effectiveness than those mentioned come into question, usually when they can considerably improve production efficiency. In capital construction the time factor is such an indicator. Thus the time for preparation of the plans or for production is delay time and time by which total effect is decreased. If it is two long, it "freezes" the investment resources during construction work, thus resulting in losses occasioned by its being tied up, not only as regards the needed product but also in unrealized profit and the like. In addition, technical and economic depreciation of capital is increased and the period of effective production utilization is decreased.

Here is where material incentives for the lower-level performing elements come to the fore. This rests on the concept of management tools which develop the enterprises' incentives or motivate them to take on more demanding assignments. This can be achieved by means of fund-creating indicators and by enterprise profit, which can be brought about by increasing prices, decreasing production expenditures and raising output. The second and third of these possibilities are considered economically beneficial. The first is advantageous only if it is associated with higher product quality. But the enterprises do not always think this way. They frequently focus on a less demanding way of achieving the designated goals, i.e. by increasing prices or by choosing the production program which is most advantageous in price terms without an investigation of sales possibilities. The situation is the same in the machinery production sector.

Connection of material incentives with enterprise profit requires:

development of the objectively necessary mechanism for central price formation;

analysis of the economic and extra-economic factors in profit formation and their reflection in the division of profit between the enterprise and the center.

However, on the basis of results that have been achieved, it can be shown that enterprise incentive is only the basis on which the decisive personal incentives are built. It must contain a stimulating factor.

Solution of the questions of economic incentive on the basis of social labor means, in capital construction, an interest in the effects of technical progress on the connections induced by transformation factors into the technical areas which determine the technical norms of production. Additional reductions (improvements) in technical norms result from social and economic relationships, i.e. from the activation of the labor force in production. This activation largely depends on the status of achievement of economic incentive for effective fulfillment of the assignments in the federal national economic plan. However, it is also necessary to solve, while the plan is being drawn up, the problem of acceptance of more demanding assignments in relation to the effectiveness of lower-level units. The results of development of enterprise plans indicate that frequently the plans have not supported the intended roles in creation of supply, but rather have been characterized by greater demands on the work force, investment and the like. This tendency can be prevented by designating the most suitable coefficients for fulfillment of plan tasks in comparison with non-plan tasks.

In addition to incentive, the financial system may play a positive role in activating production. With the proper orientation it becomes possible to bring the goals of the plan to realization both by creating an incentive for the production of supplies and also through the possibility of using them according to enterprise decision. What are involved are the construction fund, the enterprise investment fund and the technical progress fund. Here an increase in effectiveness can be achieved by various methods. On the basis, for example, of optimal time use:

deductions from profits can be graduated according to use or on the basis of improvement of the fixed capital structure;

deductions can be graduated according to percentage of active component or on the basis of early renovation of fixed capital;

the introduction of deductions from the procurement price of fixed capital instead of from the remainder, which does not support liquidation of obsolescent capital.

These are merely some suggestions for accomplishment of the demanding tasks facing the construction machinery and light prefabrication VHJ's. For this purpose, our institute has occupied itself with specific qualitative in utilization of the existing production base by noninvestment factors, of which we will cite a few for illustration.

The periods which we analyzed led us to the conclusion that it would be useful:

to support sufficient development of the production base in the coming Seventh and Eighth five-year plans,

to arrange the reproduction of fixed capital by correct designation of the percentage for simple reproduction.

For this purpose, in later periods capital construction would have to support a higher percentage of the increase in output, as shown in the table above. Noninvestment factors would and should continue to play a part. For illustration only, we would like to indicate a few of them which cannot be ignored:

Use of available working time was at 92 percent in 1975. An increase of 1 percent would mean 50 million korunas of additional output value in Czechoslovakia.

A change in production structure. One of the ways of assuring a sufficient quantity of spare parts is to support their production by the machine suppliers, which would free up capacity for overhaul of machines. With an unchanged labor force, the change in production structure would mean an increase in the quantity of general overhaul work, gradually rising from 29.0 million korunas in 1980 to 50 million korunas in 1990.

An increase in the workshift coefficient resulted in a certain improvement in 1975: 1.17 (CSR) and 1.14 (SSR). It is true that an increase in the workshift coefficient would not bring about the desired effect in every case. It also has negative aspects: an increase in expenditures on energy and fuel, increased demands for social support and for worker transportation. However, it would indeed be beneficial in many cases to view the workshift coefficient as a source of increased output, particularly where frequent utilization decreases the obsolescence of process equipment.

This means that technical progress will continue via the effect of noninvestment factors to be a fundamental source of progress in the production sector.

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POLAND

LONG-RANGE FUEL ENERGY MANAGEMENT ANALYZED

Warsaw NAUKA POLSKA in Polish No 7, Jul pp 3-23

[Article by Kazimierz Kopecki, chairman of the PAN*presidium's Energy Problems Committee and chairman of Raw Materials Group in the PAN Presidium's 'Poland 2000' Research and Forecast Committee: "Poland's Fuel-Energy Management Through 2000 As a Topic For Development Studies"]

[Text] 1. Introduction. The purpose of this article is to outline the results of research conducted up to now in Poland's fuel-energy management.[1] This field is rife with preconceptions, myths and erroneous assessments stemming from the belief, persisting in Poland for a long time, that raw materials, particularly coal, are cheap and available in vast quantities, therefore positing Poland's role in the international division of labor by and large as that of a raw materials supplier. The recognition that Poland is becoming a net importer of fuels and energy, as all industrially developed countries, except the Soviet Union, have become a long time ago, provided the point of departure for a new economic strategy, along with the acknowledgement of the real, high value of energy. It should be emphasized that this strategy is not based, as some would like to think, on negating the role of our country's raw materials and on pessimistic anti-development tendencies with regard to the entire national economy (such tendencies provide abroad the food for various diverse views with a catastrophic bent, speculations about "no growth" and "small is beautiful" and similar stuff). On the contrary, the strategy is based on sound utilization of available natural resources, including labor resources, to further socioeconomic development.

World economy's problems and difficulties whose main cause is the same as its former incentive for vigorous growth: dependence on abundant and ostensibly inexhaustible crude oil resources, cannot be bypassed in our considerations. Neither can we leave out the problems of world resources, fuel and energy waste in certain developed countries, the North-South antagonism and continually intensified imperilment of natural environment which has potential to research blogal caliber (e.g., climate changes).

The bounds of this publication dictate that only indispensable remarks be made on these problems.

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The fuel-energy issues cannot be separated from the primary products and materials problems. From the strategic point of view, they jointly constitute comprehensive long-term problems. Their examination over a suitably extended term (at least 50 years) is additionally hampered by the fact that in such issues as economic growth, social needs, labor productivity and many more we do not know a method for determining development trends with sufficient probability. Therefore, subsequent exposition is bounded by the year 2000, although there is no reason to think that this is a satisfactory solution. In further work for which there is an undisputed need, it will be necessary to revise the findings covering the period up to 2000 for a "rationalized" extension up to 2030.

To what extent these problems are interrelated is demonstrated by a substantially condensed [B-R] research and development model for the country's fuel and energy system in Fig. 1. There is a similar B-R model for primary goods and materials management.

One might ask why fuel-energy problems and raw materials problems are being combined into one whole. This is the only reasonable approach, considering that

--primary goods and materials are energy not only in terms of Einstein's theory of relativity, and they pose a major problem in the Polish economy's energy intensiveness, and

--our country's retreat, or rather a gradual, yet resolute, transition from a raw materials-oriented economic model to an economy of highly processed products with low material and energy intensiveness is the only sensible and serviceable development variant for a country desiring continued socioeconomic growth in keeping with its socialist ideas.

Finally, one might ask what are the principal growth objectives. The following brief explanation can be offered here:

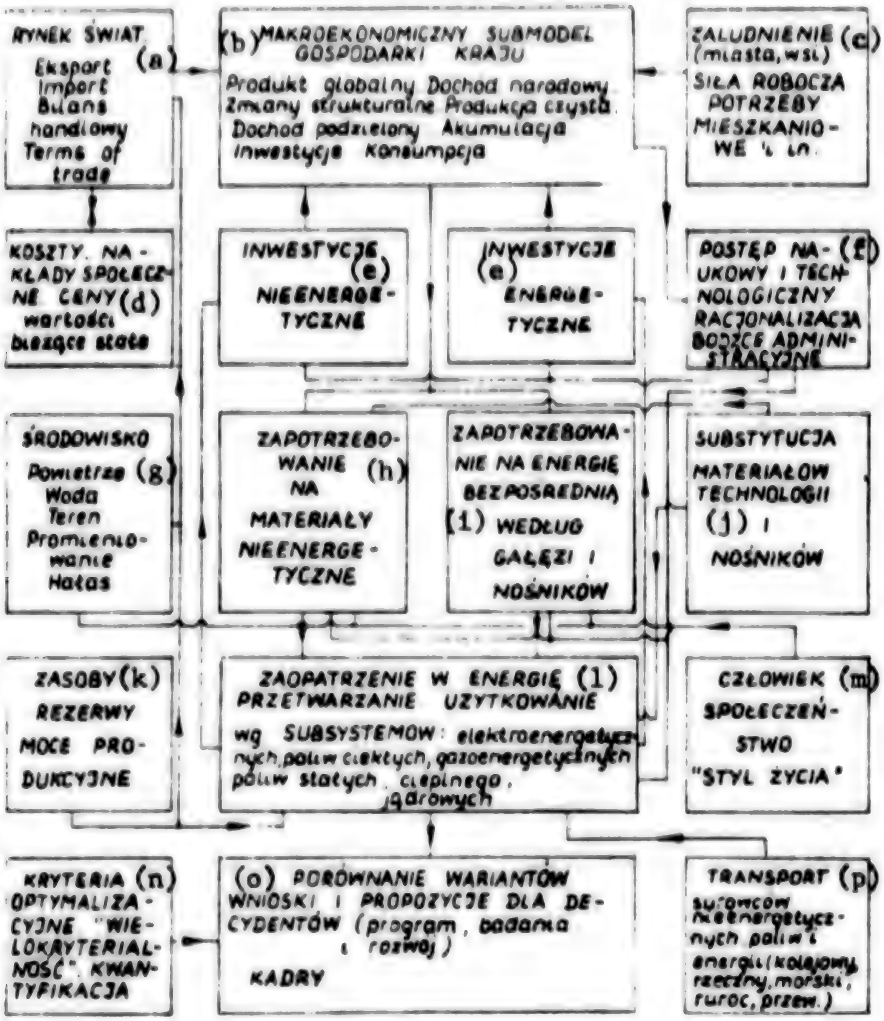
--although Poland has considerably improved her international position after prior backwardness and destructions, particularly those of WW II resulting from the Nazi invaders criminal activities, and has developed, just as other socialist countries, at a much faster pace than indicated by the world averages, there is still a lot to be accomplished: our mission is to double or even triple the national potential;

--numerous social needs persist and must be met, e.g., housing, food and transportation, all requiring virtually colossal investment;

--the population composition, in view of the substantially increased number overall of population, requires considerable increases in labor productivity in the gainfully-employed group, which is impossible without major advances in technical development, raw materials and, most important, energy;

--finally, environmental problems are increasingly intense while the counteracting of environmental perils calls for major readjustments in attitudes and in utilization of resources.

Chart 1. Raw materials and fuel-energy management model: major links.


RYNEK ŚWIAT. (a) Eksport Import Bilans handlowy Terms of trade
(b) MAKROEKONOMICZNY SUBMODEL GOSPODARKI KRAJU Produkt globalny Dochód narodowy Zmiany strukturalne Produkcja czysta Dochód podzielony Akumulacja Inwestycje Konsumpcja
ZALUDNIENIE (c) (miasta, wsi) SIŁA ROBOCZA POTRZEBY MIESZKANIOWE i in.
KOSZTY. NAKŁADY SPOŁECZNE CENY (d) wartości bieżące stałe
INWESTYCJE (e) NIEENERGETYCZNE
INWESTYCJE (e) ENERGETYCZNE
POSTĘP NAUKOWY I TECHNOLOGICZNY (f) RACJONALIZACJA BODŹCE ADMINISTRACYJNE
ŚRODOWISKO (g) Powietrze Woda Teren Promieniowanie Hałas
ZAPOTRZEBOWANIE (h) NA MATERIAŁY NIEENERGETYCZNE
ZAPOTRZEBOWANIE NA ENERGIĘ BEZPOŚREDNIĄ (i) WEDŁUG GAŁĘZI I NOŚNIKÓW
SUBSTYTUCJA MATERIAŁÓW TECHNOLOGII (j) I NOŚNIKÓW
ZASOBY (k) REZERWY MOCE PRODUKCYJNE
ZAOPATRZENIE W ENERGIĘ (l) PRZETWARZANIE UŻYTKOWANIE wg SUBSYSTEMÓW: elektroenergetycznych, paliw ciekłych, gazoenergetycznych, paliw stałych, cieplnego, jądrowych
CZŁOWIEK (m) SPOŁECZEŃSTWO "STYL ŻYCIA"
KRYTERIA (n) OPTYMALIZACYJNE "WIELOKRYTERIALNOŚĆ". KWANTYFIKACJA
(o) PORÓWNANIE WARIANTÓW WNIOSKI I PROPOZYCJE DLA DECYDENTÓW (program, badania i rozwój) KADRY
TRANSPORT (p) surowców nieenergetycznych paliw i energii (kolejowy, rzeczny, morski, rurociąg, przew.)

a. World market, exports, imports, balance of trade, terms of trade
b. national economy's macroeconomic submodel, gross product, national income, structural changes, net product, subdivided income, accumulation, investments, consumption
c. population (urban, rural), workforce, housing needs, other needs
d. costs, social outlays, prices, values, current, permanent
e. non-energy investments, e. energy investments
f. science and technology progress, streamlining, economic incentives
g. natural environment, air, water, land, radiation, noise
h. requirement for non-energy materials
i. requirement for direct energy by branches and sources
j. substitution of materials, technology and energy sources
k. resources, reserves and production capacities
l. energy supply, production, utilization by subsystems; electric power, liquid fuels, gas energy, solid fuels thermal, and nuclear
m. man, society, "lifestyles"
n. optimization criteria, "multicriteria," quantification
o. comparison of variants, conclusions and proposals for decision makers (program, research and development), cadre
p. transport of non-energy raw materials, fuels, and energy (rail, inland water, maritime, pipeline and cable)

2. Origin and History. This author presented current energy problems to the PAN General Assembly on 19 Dec 75.[2] Pertinent postulates were accepted by the assembly and submitted by the PAN presidium to the country's supreme political and administrative levels.[3] Subsequently, a project directed by this author was carried out on the strength of an agreement concluded on 18 Oct 76 between the PAN presidium and the chairman of the Council of Ministers Planning Commission.

That expert evaluation had the following goals:

--to determine Poland's raw materials and fuel-energy situation against the background of world economy and, in particular, the CEMA economies;

--to examine possibilities for and select optimal development strategies for the above outlined areas that would best meet society's needs with due allowance for current and future constraints;

--to substantiate the need for including all or most basic research, development and fuel-energy applications in a government program, and to offer conclusions for that program.

The project is composed of three parts: an experts' report proper, problem charts, and, as a separate appendix, conclusions for a long-term government program.

The experts' report was prepared by a team of twelve associates of the Power Industry Problems Committee and the "Poland 2000" Research and Forecast Committee's Raw Materials Task Force, both under the aegis of the PAN Presidium. The problem charts were prepared individually by approximately 120 experts identified on each chart.

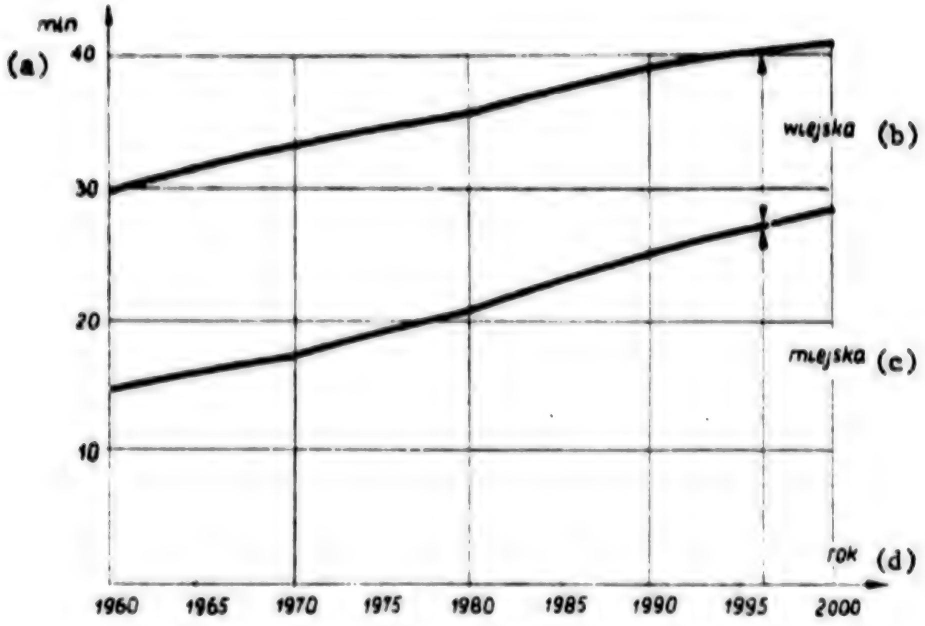
The synthetic presentation presented below is based on the experts' report, the only modification being, because of the expiration of the waiting period, that the measurement units used in the report have been replaced by the SI units in keeping with international regulations.[5]

3. Principal assumptions of the report.

3.1. Population. It is assumed that the world population (4 billion 124 million in 1977) will increase by 2000 to 6 billion 200 million, and will be 8 billion in 2020.

The figures for Poland's population (Table 1 and 2) come from the most recent GUS [Main Statistical Office] analysis and from a PAN expert report based on this analysis. It was prepared by K. Secomski, an ordinary member of the PAN. Minor revisions were made with respect to the year 2000. These figures and the number of working-age population are somewhat higher than those assumed until now.

Chart 2. Poland's Population



a. million b. rural c. urban d. year

Table 1

Poland's Population (in millions)

	(a) Lata							
	1960	1970	1975	1980	1985	1990	1995	2000
(b) Ludność ogółem								
31 XII	29,8	32,7	34,2	35,9	37,7	39,0	40,2	40,9
30 VI	29,6	32,5	34,0	35,7	37,5	38,9	40,1	40,8
(c) w tym ludność miejska								
31 XII	14,4	17,1	19,0	21,0	23,0	25,1	27,4	28,6
% ogółu	48,3	52,5	55,6	58,4	61,1	64,3	68,1	69,8
(d) ludność wiejska	15,4	15,6	15,2	14,9	14,7	14,0	12,8	12,3

a. year
b. population total: December 31, 30 June
c. including urban population, December 31, % of total,
d. rural population

3.2. National Income. There will be varying increases in the national income all over the world in different groups of countries. The values of this growth are highly diversified, depending on each estimator's assumptions, and fluctuate substantially with the course of time. In general, there is agreement in positing a stronger growth trend for the socialist countries, Poland among them.

The expected national income growth in Poland will range within the area delimited by "strong" and "weak" trends (Fig. 3).

The "strong" trend is marked by 5 percent gross annual average increases in the national income in fixed prices of 1 January 1977. This will permit the country's socioeconomic needs to be fully met by the year 2000, provided there are:

--substantial increases in management efficiency,

--substantial increases in the share of accumulation, including investment in the subdivided income, to improve efficiency, specialization and quality in industrial production, transport and farming,

--expansion in export capacities and specialization,

--a very substantial increase in labor productivity,

--reduced use of primary goods, materials and energy in the economy,

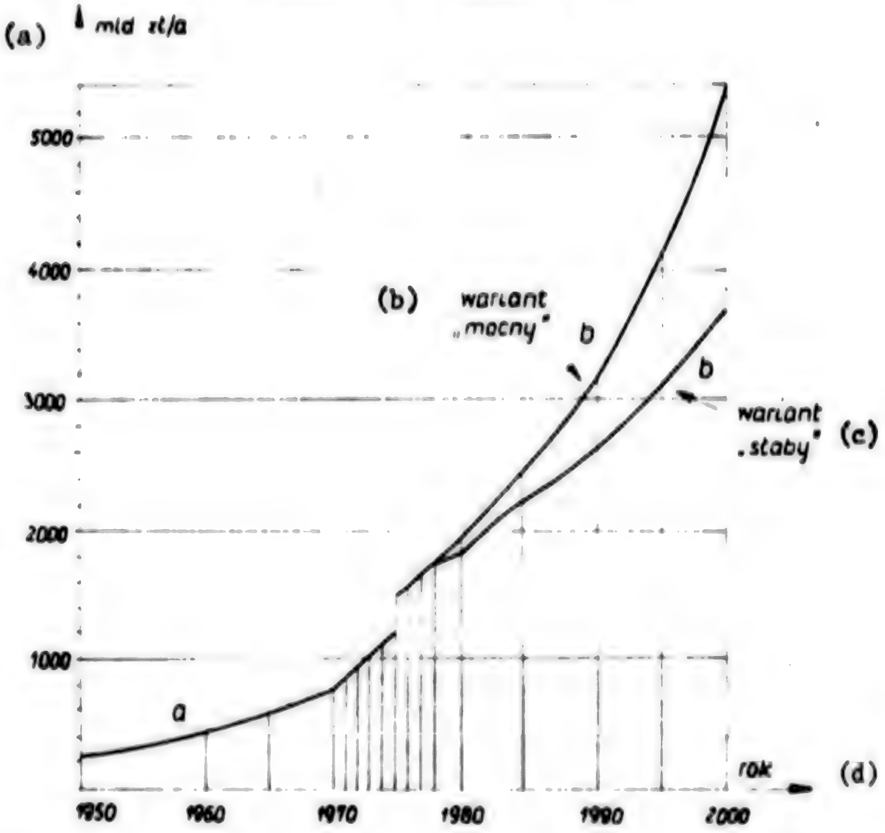
--adjustment of price ratios to social costs of products and services,

--intensified and better utilized research and development.

It should be pointed out that these conditions should be emphasized, since without their complete (and early enough) fulfillment what is termed as "desirable" growth would be out of the question.

"Weak" growth constitutes the rather undesirable bottom limit of growth. It can, however, occur if economic recession continues in the world and if there are no advances in the attempts to obtain increased management efficiency. It is characterized by a 3.5 percent average annual increment in gross national income. Because of substantial population growth, per capita increments will be significantly lower, averaging 4.3 percent and 3 percent per year. In absolute numbers, gross annual per capita national income in fixed prices of 1 January 1977 will amount in the "strong" variant to $127.9 \cdot 10^3$ and in the "weak" variant, $91.9 \cdot 10^3$ (M· a), that is, respectively, 6716 or 4823 US dollars (1974) per capita (M) annually (a). This corresponds to the present national per capita income in the United States (the "strong" variant), or to the present average in West European countries (the "weak" variant). When comparing total increments ("per country") with the values given in foreign forecasts, attention should be paid to demographic trends. A 5 percent annual increment in Poland is equivalent in terms of per capita increment to what a mere 3.5 percent annual increment would yield in the FRG whose population will decrease by approximately 10 percent by the year 2000.

Chart 3. Poland. Gross National Income: a--in fixed prices 1971, b--in fixed prices of 1 January 1977.



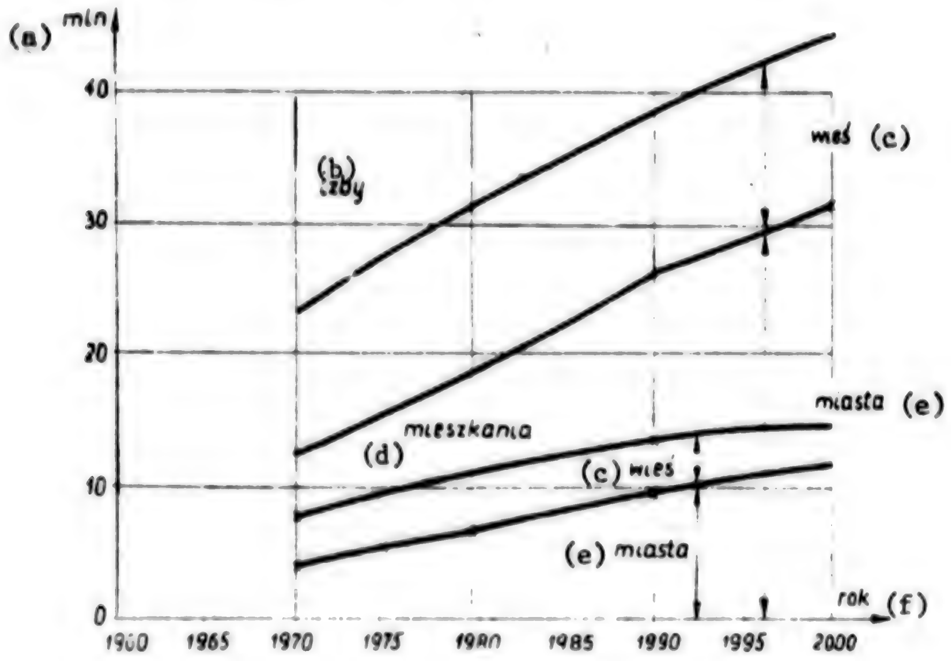
a. billions of zlotys per year
b. the "strong" variant
c. the "weak" variant
d. year

The "strong" variant indicates a 2.6-fold increase in the national per capita income as against 1977, and the "weak" variant posits a 1.9-fold increase. Some critics regard these assumptions as excessively bold, as they tend to forget our economy's much greater effects in the previous period, allowing continued growth though with some retardation.

It should not be believed that preparations in fuel-energy and materials management that are aimed at the "strong" variant are in any way wasteful of effort and resources in view of the likelihood of the "weak" variant. Possible reductions of the national income by as much as 20 percent in the year 2000 would be equivalent to a shift of marginal effects, including outlays and resources, by five years, in other words, it could be revised on an ongoing basis. In the event of excessively low commitment of resources in the early period, making up for the deficiencies is thoroughly impossible, as it would involve an automatic, enforced reduction of growth. For this reason, the "strong" variant was accepted in the report as the "leading" one.

Housing. The number and quality of apartments are a measure of effectiveness of a country's economic policy. On the other hand, along with the entire infrastructure, housing is of decisive importance for a substantial portion of the fuel and energy balance. Accordingly, this issue is given especial attention. Because of the social significance that satisfaction of housing needs and due consideration of the evolving urban-rural relations possess, substantial revisions were made in the previously determined figures, on account of a new demographic forecast (Fig. 4 and Table 2).

Chart 4. Poland. Apartments and rooms.



a. millions
b. rooms
c. rural
d. apartments
e. urban
f. year

These figures indicate that the average number of persons per room will decrease in urban areas from 1.36 in 1970 to 0.9 in 2000, and in rural areas, from 1.47 in 1970 to 0.98 in 2000. This corresponds to the "strong" variant. In the "weak" variant, such effects will not be possible.

4. Main theses of the experts' report. The following are its leading premises:

a. In order to reach the objectives determined by the Sixth and Seventh PZPR Congress and by the Second Nationwide PZPR Conference and in order to continue its socioeconomic development at an elevated rate, Poland needs further economic growth, both as extensive and as rapid as possible.

b. This growth must be ensured by means of economic development in raw materials and fuel-energy sectors; aside from the economies of efficient management, it is not possible to combine maximum economic development with minimized, or retarded, raw materials and fuel-energy base.

Table 2

Housing In Poland In 1970 Through 2000

			1970	1975	1980	1990	2000
(a)	**Miasta**						
(b)	ilość izb	10^6	12,6	15,6	18,8	26,4	31,8
(c)	ilość mieszkań	10^6	4,55	5,37	6,5	9,4	11,4
(d)	powierzchnia użytkowa	10^6 m^2	213	254	320	490	620
(e)	mieszkańców na izbę		1,36	1,22	1,12	0.95	0.9
(f)	**Wieś**						
(b)	ilość izb	10^6	10,6	11,4	12,3	12,6	12,6
(c)	ilość mieszkań	10^6	3,53	3,61	3,71	3,49	3,5
(d)	powierzchnia użytkowa	10^6 m^2	197	210	227	232	238
(e)	mieszkańców na izbę		1,47	1,33	1,21	1,1	0,98

a. cities
b. number of rooms
c. number of apartments
d. useful floorspace
e. residents per room
f. countryside

c. Deterioration in international terms of trade, coupled with Poland's shortages in many raw materials and energy that already exist or may soon develop, demand increased attention to be paid to a virorous and steamlined development in the domestic base of fuels and energy as well as in convertible goods.

d. The shortages can be reduced by establishment of faciliites and incentives that will lower current materials-intensiveness and energy-intensiveness in industrial production and residential heating. Streamlining projects must become the main topic of research applicable to investments now in progress as well. They must likewise be put in effect as soon as possible.

e. The good of man is a superordinate goal; hence, raw materials and energy should be considered as a principal factor in the country's socioeconomic development, while environmental destruction that results from the processes of extraction, processing and utilization of raw materials, fuels and energy should be regarded as an evil that must be eliminated.

f. Natural resources that are to be reused up in a sensible manner by the present generation must be replaced by new assets or engineering techniques that will ensure socioeconomic development for subsequent generations. Selfishness and predatory attitudes are impermissible.

g. The socialist countries' production concentration, streamlining and specialization, along with broadest possible trade exchange constitute the guideline for Poland's international collaboration; however, open cooperation with other countries is also necessary, provided it leads to acceleration in Poland's growth.

5. Non-energy raw materials and problems in intensifying the use of the domestic raw materials base.

5.1. Energy-intensiveness, acquisition of raw materials and other resources. Energy input involved in obtaining various products is underestimated vis-a-vis the importance of raw materials. For example, in steel-making, costs related with investment outlays and operation are 27 percent, raw materials costs are 29 percent, and fuel and energy costs are 44 percent. Low-grade raw materials require a much higher input of fuels and energy. Therefore in all problems involving substitution of one raw material by another, replacement of an imported raw material with a domestic one, and, most important, intensification of the domestic raw materials base, due consideration must be given to fuel-energy management, while recognizing that the social outlays of making primary materials and products available are not determined by current domestic prices (the latter are in some cases three or four times lower than respective social outlays). Determination of actual social outlays, or what is termed "index prices," and determination of their composition are a fundamental issue in research and development studies. In simplified terms, it can be indicated that in the face of Poland's raw materials and energy shortages, the authoritative prices applicable to processes in which coal use can be reduced or increased are the export prices of coal (currently ranging at approximately $30 for power coal and much higher for coking coal), while for the processes affecting consumption of natural gas or petroleum products, it is the import prices of these raw materials.

Many industrial processes based on the concept of abundant and cheap energy (underground sulfur smelting by gas, dry production of cement, early methods in steel making, the processing of low-grade ores and raw materials, carbon chemistry based on the first-generation methods, and construction using the concept of lightly insulated large panels) are indefensible in terms of correct cost effectiveness analysis. They cannot even be justified by ostensible successes in exports or in import substitution, because these, in turn, are paid for in reduced coal exporting capacity or increased imports of gas and crude. An overall and unequivocal formula cannot be provided for this issue, as each case requires careful analysis involving a lot of effort of numerous teams of specialists. Our concern here is with several billion worth of differences in social outlays per year, e.g., in coal-based methanol production with first-generation methods, they amount to 12 billion zlotys per year. It is worth noting, of course, that such analyses must include outlays on infrastructure (transport, water) and suitable environmental proteciton, on top of outlays on production proper.

5.2. Materials-Intensiveness of Production.

A second important issue that directly affects efficiency in many production techniques is their materials intensiveness. As noted above, this factor directly affects our economy's energy intensiveness. In relation to national income, steel use in Poland nearly doubles steel use in the United States, FRG, Great Britain, and almost triples steel use in France. Assuming identical per capita national incomes, steel use in Poland ranges on a level that exceeds by nearly 50 percent the desirable levels, which is partially due to the economic system and yet in part results also from insufficient improvement in steel utilization. Worth noting are: a considerable share of extraction industries in steel consumption because of enhanced mechanization and depth of the mines (nearly 15 percent of total 1975 consumption), a disadvantageous geographical composition of bulk transport resulting in substantial steel use in heavy transport vehicles and railroad track (10.2 percent), manufacture of lightly processed products (ship hulls, tanks, railroad cars), heavily materials-intensive structures and production engineering techniques in heavy industry and electro-engineering industry as well as industrial construction and housing, shortages of steel varieties with needed quality, obsolete composition of the steel product range, inadequate corrosion protection, and insufficient interest on the part of industrial scientific research facilities.

There is a thoroughly similar state of affairs in cement and many other materials.

In other words, not only is steel and cement production in Poland exceptionally energy-intensive when compared with the modern methods: these materials are also consumed in excessive quantities.

5.3. Waste Materials Utilization

The third factor adversely affecting the economic level is seen in underuse of waste materials (recycling) of various kinds in which there remain substantial amounts of unused energy.

6. Water

Water significantly effects the problems under analysis and has a particular relevance in our country where water systems are relatively poor and water management suffers from centuries of neglect (due to the former political situation). An already important proposal concerning the development of Lower Vistula has already been carried into effect, though not to its full extent (establishment of an industrial basin in which to locate nuclear power plants and water-intensive industries). The experts' report extensively covers a number of issues concerning the acquisition and utilization of water.

7. World Energy Problems and Fuel-And-Energy Situation

Worldwide problems directly affect Poland's development prospects in the fuel/energy sector. From 1973 on, the world has suffered from a constantly aggravating crisis caused by hydrocarbon shortages crude oil, in particular, (due to political and economic reasons). Other factors included a disparity between the mounting requirement and the possibilities to meet this requirement; limited resources, escalating imperilment of natural environment, and, finally, a confrontation of paramount importance for the future of the world in which a huge part of our globe, inhabited by 70 percent of its total population with trends for considerable further growth though consuming merely 20 percent of fuels and energy stands opposed to developed countries, with concomitant social, cultural-educational and economic (food) problems. The main cause of this disparity is the U.S. economy's excessive (2-3 times too much) energy consumption, primarily resulting from transport needs and individual use.

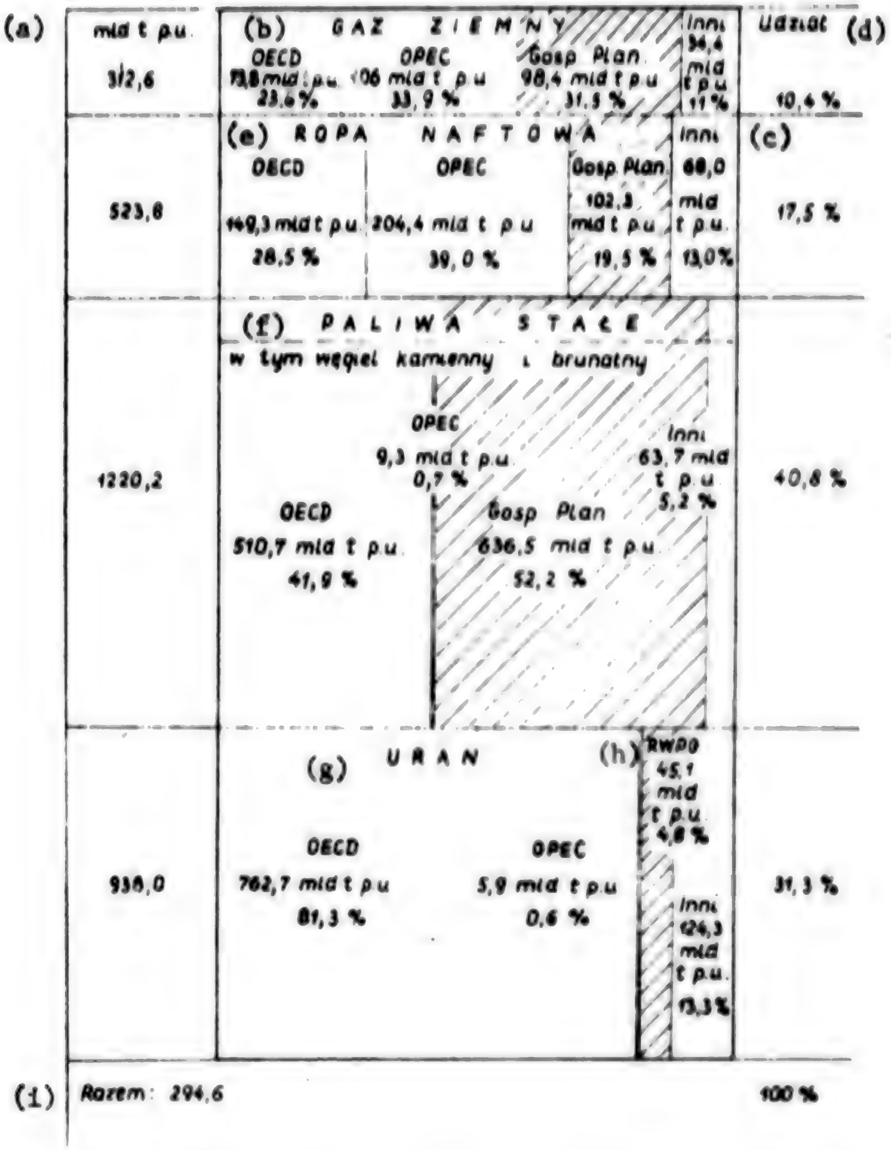
In 1973, the world was geared toward continued increases in share of hydrocarbons, or crude oil and natural gas, in covering energy-fuel needs. They covered nearly 29 percent of world requirement in 1950, while coal accounted for almost 50 percent. Despite current restrictions, the hydrocarbon share still ranges about 60 percent, with less than 30 percent coal. Hydrocarbons, crude oil in particular, have spurred change in modern civilization causing especial advances in farming, transport, chemical production and armaments, and were instrumental in increasing consumption and mobility in world societies.

In evaluating future growth in world fuel/energy economy (and Poland's economic growth which is contingent on it), attention must be paid to: future growth rates and differences in economic growth of particular groups of countries; resources in each energy raw material with special emphasis on their acquisition over particular periods, rational energy use improvements that are necessary and feasible during those periods,[6] capacities to budget increasing shares of capital investments in overall investment and to cover the latter from subdivided national income, constraints resulting from reduced workforce growth in developed countries, the need for greater protection of natural environment, and mounting outlays on exploration for raw materials and on research and development.

All along, it should be remembered that our generation's bounden duty is to leave on the Earth conditions for further improvement of the standard of living of all people.

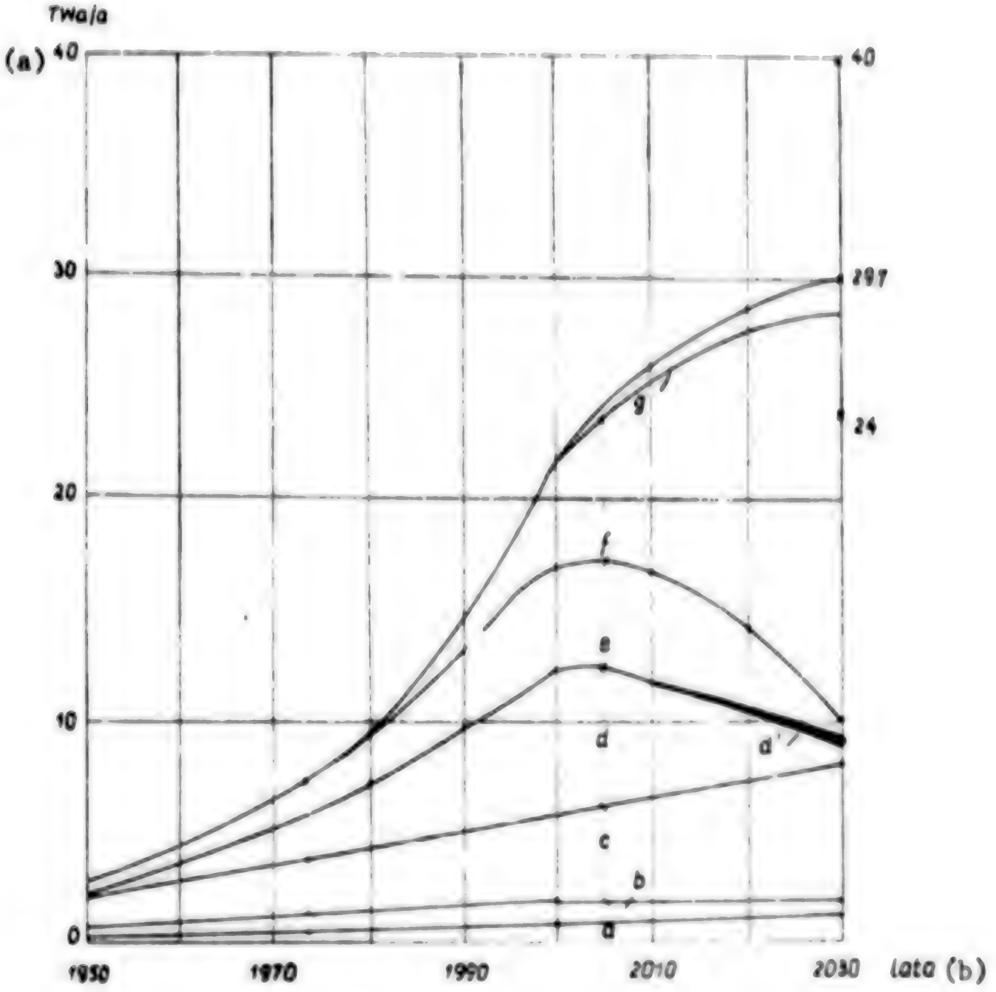
The experts' report provides a detailed analysis of current views about levels of energy resources and reserves[7] (Fig. 5) and about likely production potential and fuel-energy sector's development in the world. (Fig. 6).

Chart 5. Projected technically attainable world resources in primary energy (fossils) as of 1 Jan 1975. 1 billion tons of standard fuel equals 0.929 TW.a [terawatt per year]



a. tons of standard fuel [t.p.u.]
b. natural gas, Organization for Economic Cooperation and development [OECD], Organization of Petroleum Exporting Countries [OPEC], planned economy
c. other
d. share
e. crude oil
f. solid fuels in which coal and lignite
g. uranium
h. Comecon [RWPG]
i. total

Chart 6. The world's primary energy requirement: a--hydraulic, b--firewood, c--coal, d--crude oil, d'--oil from bituminous sand, e--natural gas, f--nuclear energy, g--"new" sources of energy. The points marked by 24 and 40 refer to the "weak" and "strong" forecast of the International Institute for Applied Systems Analysis in Laxenburg



a. tezawatt per year b. year

From this, it follows rather unequivocally that crude oil use will peak in about 15 to 20 years, natural gas use somewhat later, and coal extraction will continue to grow covering, in percentages, one-fourth of total fuel and energy requirement. Notwithstanding all possible streamlining to ensure rational use, there will be steady increasing shortages in conventional fuel and energy. It will be impossible to cover these shortages by rising use of relatively small water power resources or by "new energy sources" including solar energy, gasification, liquefaction of organic waste. In 2000, hydraulic energy share will be less than 5 percent while new energy sources will account for 2.1 percent.

Unless bridged by utilization of nuclear energy, the "energy gap" will continue to expand until around mid-21 century when greater possibilities will open for increasing hydrocarbon extraction by tertiary method of deposit stimulation and by working those deposits that are currently unworkable or inefficient like bituminous sands and shales and Arctic resources, and when underground coal gasification is extensively developed along with the use of solar energy. Despite some difficulties, primarily of psychological nature, many countries increasingly utilize nuclear energy resources along these three principal directions:

--thermal reactors, primarily light-water-pressurized, currently accounting for more than 50 percent of all reactors in operation and under construction,

--breeder reactors which, due to their markedly better (up to 60 times) utilization of nuclear fuel, are expected to prevent a "uranium crisis" and extend nuclear energy growth over more than a thousand years,

--high-temperature reactors, currently in initial stages, that are expected to ensure considerably more efficient use (up to 50 percent) of coal in chemical production, thus prolonging world use of coal resources by several hundred years.

The experts' report foresees that nuclear energy shares in world energy balance (currently in excess of 1 percent) will be approximately 21 percent in 2000 and more than 50 percent in 2030. It is worth noting that no alternative exists for meeting energy needs (reduced by half in comparison with earlier forecasts),[8] while dreams about some miraculous substances are nonsensical. It should be added that energy prices will certainly rise (in fixed prices), considering that e.g., solar energy (extremely materials-intensive) which is being regarded by many experts as if it were costless, will provide electric power at a cost nearly five times the cost which can apply to a lesser degree to other energy sources.[9]

8. Poland'd Energy Resources

8.1. Hard coal. As of 31 Dec 1976, hard coal resources in Poland were 57.7 billion tons, offering possibilities of extraction over approximately a hundred years. Extraction growth rate is, however, dependent on continued research, exploration and most importantly, geological identification as well as on the potential production capacities of mining construction enterprises and organizational and personnel infrastructure in the mines. Deterioration in quality coal due to extraction method used and increases in sulfur content (in relation to heat-generating capacity) requires mechanical processing and benefaction in some fields, which, in turn calls for utilization of waste material locally by erecting electric power and heat generating plants predesigned for burning high sulfur content silt and slag and low caloric wastes with a high sulfur content. Environmental protection in mining areas requires high-grade desulfurization of exhaust gases, while scarcity of water calls for air-cooling plants. We are referring here to power plants adjacent to mines because it is mining and industrial areas that are particularly suited for initiating area heating plant systems through which local pollution can be reduced and increased heating industry needs can be met more efficiently.

Coal is our primary resource but it should not be used wastefully. Increased output and protection of future extraction coupled with broadest possible protection of water and air should be our goals. In future, coal will lose its importance as a fuel while becoming more important as a raw material, primarily in the manufacture of synthetic gas, methanol and hydrogen by high-temperature reactors and, in the more remote future, probably diesel oil and synthetic gasoline as well. Research projects in this field, from so-called second generation on, should be conducted with considerable intensity, which is the purpose of governmental program #1.

Growth in hard coal output is constrained by increasing capital intensiveness of extraction, transport problems, and limited possibilities for gains in labor productivity with small growth in employment. It is expected that output from operating mines and those under construction at this time in the Upper Silesia Coal Basin will increase to nearly 250 million tons per year. Subsequent increments (amounting to approximately 50 million tons a year by the year 2000) will be realized from the Lublin Coal Basin now being developed and from the mines that are currently being opened.

8.2. Lignite.

Substantial increases are projected in lignite extraction. The lowest level assumed in the experts' report are 125 million tons in 1990 and 180 million tons in 2000 with a suggestion that these quantities should be exceeded. This will involve substantial strain on financing and organization because lignite exploitation will proceed (with few exceptions) under increasingly difficult mining and geological conditions owing to significant increases in the outlay-to-coal mass ratio and depth of cone of depression. It is imperative to develop a major industry manufacturing machinery and equipment for strip mining along with establishment of vigorous co-production links with other countries, primarily those holding CEMA membership.

Because of considerable sulfur content of some seams (as compared with their calorific value), it is necessary to designate such seams for low calorie gasification to generate electric power in gas and steam turbine units, complete with gas desulfurization prior to combustion since this method appears to be more efficient than desulfurization of combustion gases.

8.3. Hydrocarbons.

Poland's potential in crude oil output will be limited to 0.5-1.0 million tons per year over the years 1980-2000, with 7.0-7.5 billions of cubic meters of gas per year in the same period, including nearly 50 percent of nitrided gas. Converted, this yields 5.0-5.5 billion standard cubic meters [Nm^3/a] of high-methane gas (8,000 kcal/Nm^3 = 8.44 mega-joules per standard cubic meter [MJ/Nm^3]). Domestic resources would suffice for somewhat less than 50 years to cover this highly profitable production, but there is a need for increased exploration with modern methods, deep drilling to 6-8,000 m to increase seam yields and for handling problems in utilization of natural gas with a diversified and changing nitrogen concentration. Efforts should be made to equalize all output for the sake of standardization of the system (as has been done in France) and recovery of helium if sizeable helium resources are found.

8.4. Export and import of energy raw materials.

It appears possible, at least until 2000, to maintain hard coal exports on present levels. This, however, is not completely certain, especially if, with the "strong" variant being put into effect, there is none of the intended growth in nuclear power engineering both for electric power and for heat generation. On the other hand, there are prospects for considerable increases in imports of hydrocarbons because of their indispensability to particular recipients (transport, farming, industry and, to a lesser degree, decentralized heat generating industry) and because of balance sheet requirements.

Examining several variants of the crude/gas ratio in the totality of imported hydrocarbons, a distinct preference for so-called "big gas" is seen because of the following reasons:

--world natural gas resources will start becoming depleted at a later time than crude oil,

--there are immense natural gas resources in the Soviet Union, permitting the least expensive transport overland through pipelines with very large diameters and throuput capacity,

--this will enable Poland to join the developing continental Europe gas system and realize the benefits that ensue from such connections and from transit.

We should reckon with the need to finance this undertaking with the aid of an international bank consortium, as is being done now in the transmission of natural gas from the Soviet Union to the West, and the need to develop a suitable potential in the manufacture of pipes, other equipment and in construction.

8.5. Nuclear fuel

Meeting future needs of nuclear power engineering is a matter of utmost importance. These needs and possibilities for participation in the process of fuel preparation and processing and in dumpting nuclear waste have been roughly identified.

9. The state and development of Poland's fuel/energy management.

Poland is among countries that are highly energy-intensive in relation to their national incomes. This is caused by considerable energy-intensiveness of industrial production and construction, uncontrolled and excessive use of heat in cubature heating (due to low insulation ratings in both residential and industrial construction) and, finally, excessive materials-intensiveness of the economy (cement and steel, above all).

Hence, in order to determine future energy requirements and the power engineering base needed to ensure such development including those sectors that provide its supply, it is necessary to determine:

--how the economy will develop (structural and quantitative changes), what generated income will result from this development, and what resources will be allocated to steadily increasing power investments,

--what genuine effects will be brought about by rational streamlining of fuel and energy consumption and, prior to this, what resources will be allocated and utilized for this purpose.

These two major factors: economic growth and a streamlining policy, will determine fuel and energy requirements.

This can be expressed from a macroeconomic point of view in the formula:

$$e_{ft}{}' = e_f^{\tau_0} \times \prod_{t=1}^{t'} p_t^{\beta_t} \times \prod_{t=1}^{t'} y_t^{\gamma_t} \times (1 - R_t\sigma_t),$$

in which $e_{ft'}$ denotes requirement for direct (final) energy over time t' per capita per year; $e_f^{\tau_0}$ --initial constant over time t = 0; P_t energy price index P_t / P_{t-1}; β_t --flexibility coefficient of direct energy per capita per annum in relation to energy price over time t; y_t

NPG [national gross product] per capita per annum, coefficient of flexibility of aforementioned energy in relation to NPG; R--intensity of operational effects (response) of streamlining policy (0--limited, 1--effective) --partial energy savings in the event of an effective response, a constant derived from period of application of a streamlining policy.

This yields the country's entire direct energy over time t'$E_{ft'} = L_{t'} e_{ft'}$ in which $L_{t'}$ is population as of 30 June. Hence, the country's primary energy requirement is computed:

$$E_{pt}{}' = \frac{E_{ft}{}'}{\eta_t{}'},$$

in which $\eta_{t'}$ denotes domestic efficiency in primary-to-direct energy conversion, allowing for losses in primary-to-secondary energy conversion, internal consumption of the system, and transmission (transport) losses.

More precise results requiring a very extensive research apparatus are obtained by a microeconomic method composed of the following steps:

Step 1. Selection of n "products" x representing the country's entire economic activity, e.g., steel production, rail transport, passenger and cargo automotive transport, or remotely heated surface, $i = 1 \ldots n$ --type of product, $n \sim 100$.

Step 2. Analysis by teams of experts of structural and quantitative composition of product modification in years $j = 0, 5, 10, \ldots$, considering potential and desirable product substitution, e.g., steel by aluminium, or by plastics, ordinary steel by quality steel, and composition of a matrix P_{ij}; P_{ij} represents the index of changes in each product i in year j in relation to the zero year.

Step 3. Determination of value added [excluding material services] a_{ij} per unit of each product; hence the country's entire value added in year j.

$$A_j = \sum^{i} a_{ij} x_i p_{ij}.$$

Step 3'. Subdivision into particular economic branches and trend verification for value added generated by particular branches on the basis of historical data.

Step 4. Analysis and forecast for direct energy-intensiveness e_{ij} of each product i and year j and composition of a matrix

$$\begin{array}{llll}
e_{10} & e_{15} & e_{1-10} & \cdots \\
e_{20} & e_{25} & e_{2-10} & \cdots \\
\cdots & \cdots & \cdots & \cdots \\
e_{ij} & \cdots & \cdots & \cdots
\end{array}$$

Step 5. Calculation of the country's total requirement for direct energy in year j

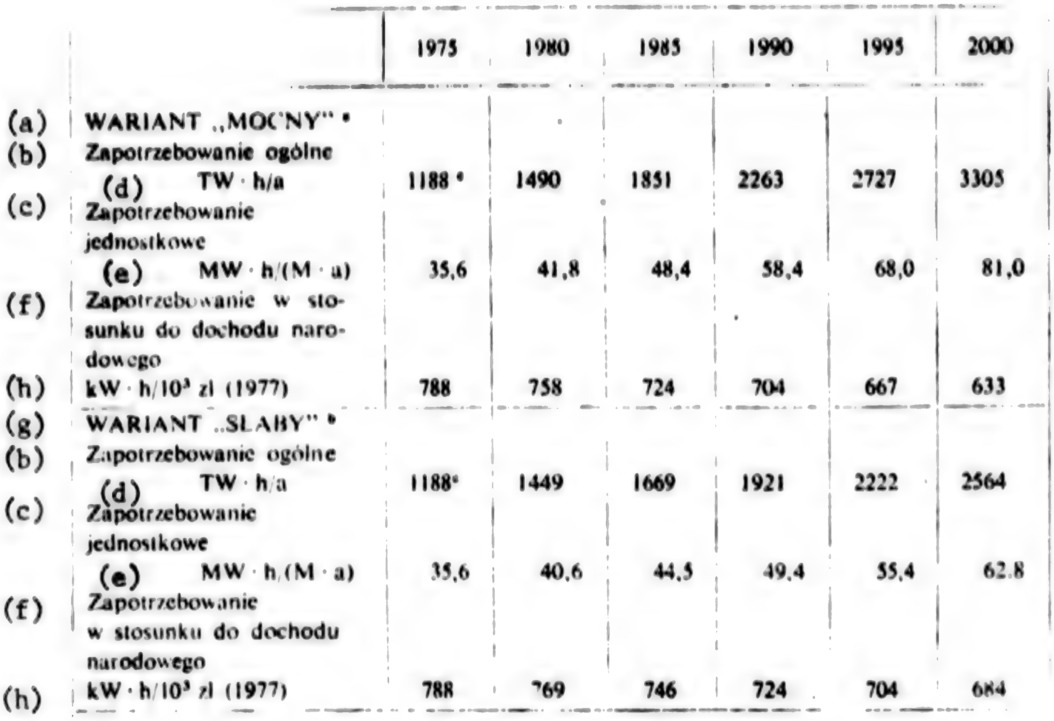
$$E_{fj} = \sum_{i} x_i p_{ij} e_{ij}.$$

Step 5'. Breakdown of E_{ff} into particular economic branches and trend verification for direct requirements of the branches based on analysis of historical data.

Step 6. Subdivision of direct requirement by branches for sources based on analysis of this requirement.

Step 7. Calcualtion of primary energy requirement through analysis of aforementioned coefficient n_t' as above.

Table 3. Poland's Requirement In Fuels and Primary Energy in 1975-2000



		1975	1980	1985	1990	1995	2000
(a)	WARIANT „MOCNY" ^{a}						
(b)	Zapotrzebowanie ogólne						
(d)	TW · h/a	1188 ^{c}	1490	1851	2263	2727	3305
(c)	Zapotrzebowanie jednostkowe						
(e)	MW · h/(M · a)	35,6	41,8	48,4	58,4	68,0	81,0
(f)	Zapotrzebowanie w stosunku do dochodu narodowego						
(h)	kW · h/10^3 zl (1977)	788	758	724	704	667	633
(g)	WARIANT „SLABY" ^{b}						
(b)	Zapotrzebowanie ogólne						
(d)	TW · h/a	1188 ^{c}	1449	1669	1921	2222	2564
(c)	Zapotrzebowanie jednostkowe						
(e)	MW · h/(M · a)	35,6	40,6	44,5	49,4	55,4	62.8
(f)	Zapotrzebowanie w stosunku do dochodu narodowego						
(h)	kW · h/10^3 zl (1977)	788	769	746	724	704	684

a. "strong variant"
b. total requirement
c. unit requirement
d. terawatt-hours per year [TW·h/a]
e. megawatt-hours per (mega-year) [MW·h(M·a)]
f. requirement in relation to national income
g. "weak variant"
h. kilowatt-hours per 10,000 zlotys

[Note under table] ^{a}national income growth 5 percent, average annual growth in per capita requirement in fuel and energy 3.3 percent; ^{b}National income growth 3.5 percent; requirement 2.3 percent. ^{c}Adjusted for average temperature of winter months.

Step 5'. Breakdown of E_{ff} into particular economic branches and trend verification for direct requirements of the branches based on analysis of historical data.

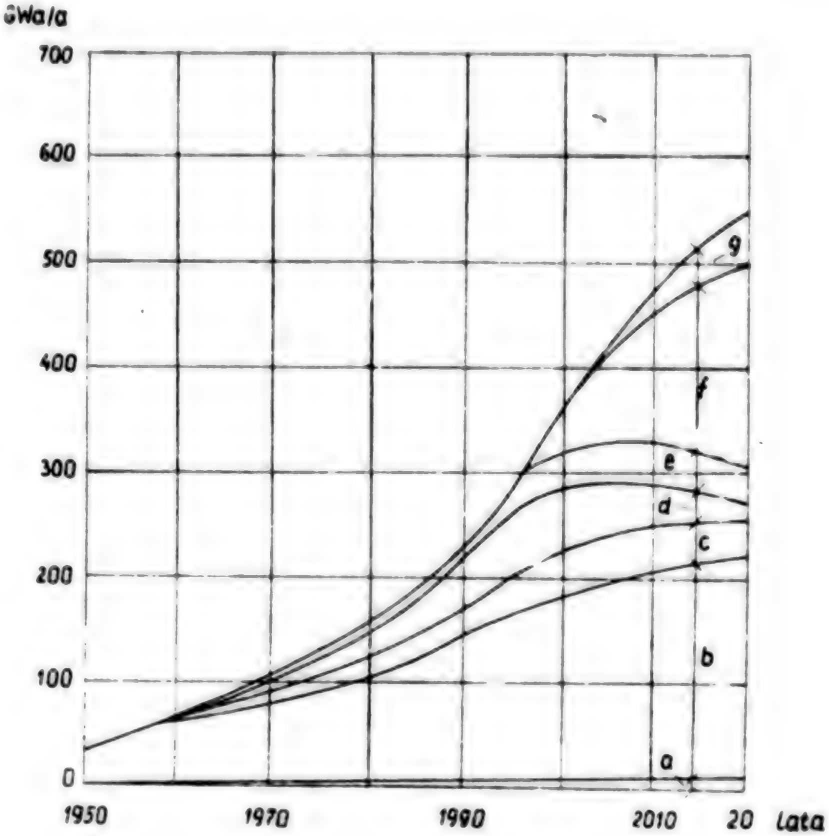
Step 6. Subdivision of direct requirement by branches for sources based on analysis of this requirement.

Step 7. Calculation of primary energy requirement through analysis of aforementioned coefficient n as above.

This method typically exemplifies the application of systems analysis methods to an entity as complex as an energy system. Of course, it can be applied to limited objectives, e.g., to analyze an electric-power system or a gas-power system, in this case, however, effects resulting from analytical comprehensiveness are lost, e.g., in investigating substitution of electric power by gas, or reversely. This methods permits constant monitoring of structural changes in domestic national economy and in energy management as well as directions and effects of streamlining policies.

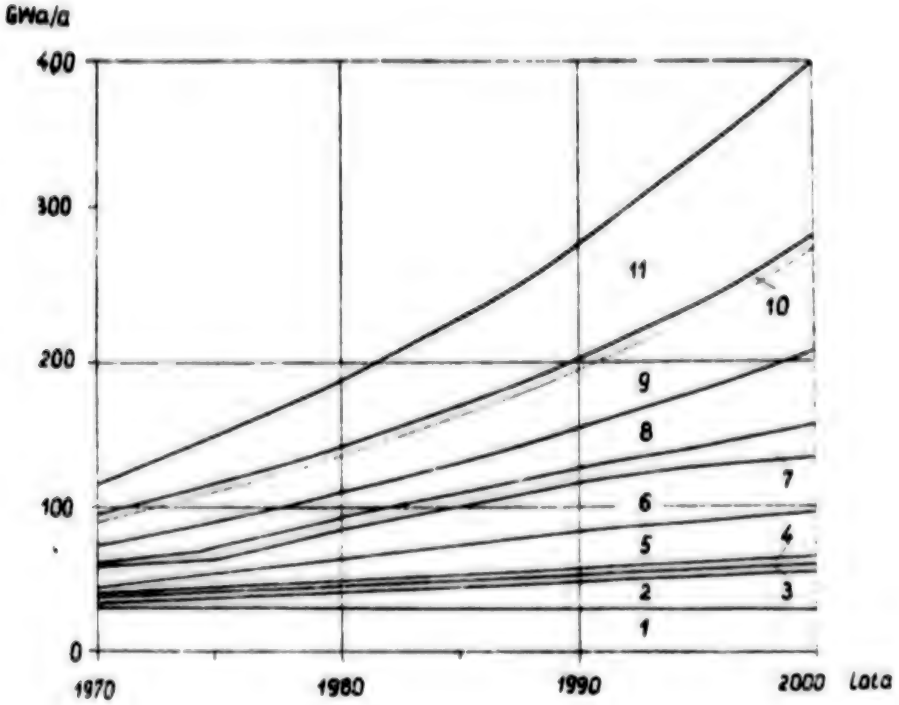
As a result of these analyses, fuel and primary energy requirement was determined, Table 3 and Fig. 7 (a structural breakdown is shown in the chart).

Fig. 7 Poland's primary energy requirement under the "strong" variant: a--hydraulic energy, firewood, and peat; b--hard coal; c--lignite, d--crude oil; e--natural gas, f--nuclear energy; g--"new" energy sources and imported fuels processed from coal.



It is notable that considerable importance is attributed to the development of nuclear engineering in Poland, with an estimated output of 24 GW electric power and an additional 5 GW thermal power (for the heating industry) in 2000. The value and quantity and breakdown of direct requirement for fuels and primary energy by sources and branch are shown in Fig. 8 and 9. These charts apply only to the "strong" variant.

Fig. 8. Poland's consumption of primary energy by source under the "strong" variant: 1--coal, 2--natural gas, 3--other primary energy sources, 4--coal and lignite briquets, 5--coke, 6--liquid oil-based fuels, 7--manmade gas, 8--electric power, 9--remote heat (water or steam), 10--exhaust heat, 1-3--primary energy, 4-10--secondary energy, 11--conversion and transport losses.



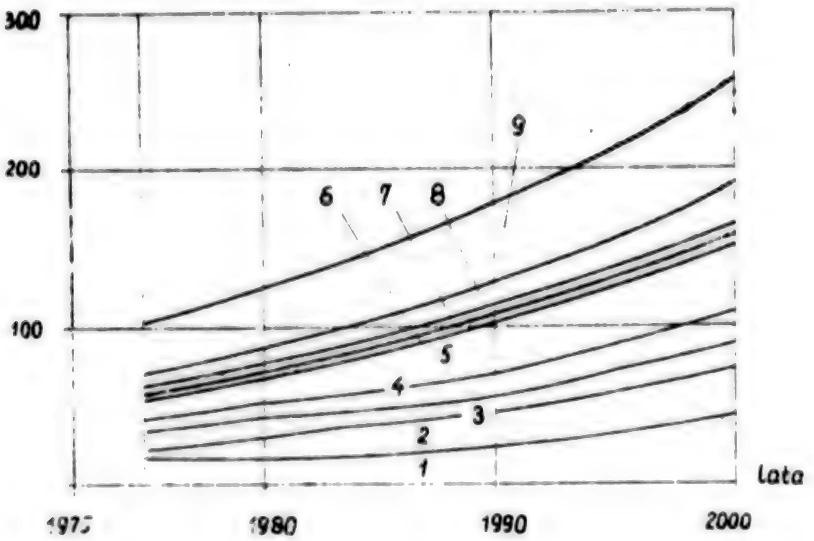
Electric power requirement in 2000 is estimated at 454 to 484 TW·h/a, which corresponds to installed capacity of 91 to 97 GW of which 6-7 GW in industrial electric power engineering, 24 GW (electric) in nuclear power and power and heat-generating plants, and 6.2 GW in hydroelectric power plants.

10. Main conclusions of the experts' report.

Because it is impossible to summarize the totality of work that resulted in creating a comprehensive expert evaluation of this kind, its essential conclusions will be given.

1. The assumed socioeconomic growth for Poland will induce rapid increases in fuel and energy requirement which, if the process is uncontrolled (a governmental program is being developed for further action in this direction), may lead to an inability to meet requirement or to considerable retardation of growth.

Fig. 9. Poland's consumption of primary energy by branch ("strong" variant): 1--steel and iron industry, 2--chemical industry, 3--construction materials industry, 4--fuel-energy industry (internal consumption), 5--other industries, 6--consturction, 7--farming, 8--transport, 9--municipal-residential sector



2. There is a foremost need for a far-reaching and rapidly institute rational streamlining of fuel and energy use.

3. Substantial imports of hydrocarbons and nuclear fuel are imperative, with crude oil imports restricted to indispensable levels and priority given to natural gas.

4. Other imperatives are: a highly dynamic development of nuclear power engineering, remote heating systems and coordinated management in particular, utilization of hydro power resources by 2000, a considerable development of pumped-storage electric power plants, establishment of a 20 percent power reserve in the electric power system and a vigorous development of this system.

5. In order to meet developmental needs of the entire power industry and to reduce imports of equipment and establish a production-export support base to finance increased imports of fuels, in particular, development in highly efficient processing industries: general energy (power machinery and equipment), electrotechnical, industrial a[illegible] and chemical flow-line systems.

6. It is necessary to enhance protection of natural environment and human beings from perils resulting from power engineering.

7. Science and research are the essential basis for action. If there is no growth in existing research and development base, further advances in all of power industry are unthinkable.

Appendix 1

A table of conversion factors for measurement units applicable to energy.

(a) Norma kJ	(b) Dozwolone		(e) Nie dozwolone		
	(c) kW · h	(d) kW · a	(f) kcal	(g) Btu	kg p.u. (h)
1	$0{,}2778 \cdot 10^{-3}$	$3{,}171 \cdot 10^{-8}$	0,2389	0,9481	$34{,}13 \cdot 10^{-6}$
$3{,}6 \cdot 10^{3}$	1	$1{,}142 \cdot 10^{-4}$	860,1	3413	0,1229
$31{,}54 \cdot 10^{6}$	8760	1	$7{,}534 \cdot 10^{6}$	$29{,}90 \cdot 10^{6}$	$1{,}076 \cdot 10^{3}$
4,186	$1{,}163 \cdot 10^{-3}$	$1{,}327 \cdot 10^{-7}$	1	3,968	$1{,}429 \cdot 10^{-4}$
1,055	$0{,}2930 \cdot 10^{-3}$	$3{,}345 \cdot 10^{-8}$	0,2520	1	$3{,}600 \cdot 10^{-5}$
$29{,}30 \cdot 10^{3}$	8,139	$9{,}291 \cdot 10^{-4}$	7000	$27{,}776 \cdot 10^{3}$	1

a. standard kilo-joule
b. permissible
c. kilowatt-hour
d. kilowatt-year
e. impermissible
f. kilo-calorie
g. British thermal unit
h. kilogram standard fuel

In foreign, especially American studies the following units are also used:

1 kilogram oil equivalent equaling 10,000 kilo-calories
10,500
10,800

Assuming the last value:

1 BOE barrel of oil equivalent equals 136 kilogram oil equivalent equals 1,469 giga-calories equals 6,150 giga-joules equals 1,708 megawatt-hours equals $5{,}826 \cdot 10^{6}$ Btu equals 209.8 kilogram standard fuel

1 BDOE (barrel per day of oil equivalent) = 365 BOE/a =
= 536.1 giga-calories per year = 2,245 tera-joules per year =
= 633.4 megawatt-hours per year = 5.461 gigawatt-year per year =
= $2.127 \cdot 10^{9}$ Btu per year = 76.58 tons standard fuel per year.

FOOTNOTES

1. K. Kopecki and associates, experts' report titled "National economy raw materials supply with focus on optimization methods for fuel-energy management and intensification of domestic base of raw materials," Warsaw, 1978.

2. K. Kopecki, "Problems Facing Comprehensive Energy Development in Poland," NAUKA POLSKA, No 6, 1976.

3. PZPR Central Committee Political Politburo's report read by First Secretary Gierek to the Second PZPR Conference on 9 Jan 1978.

4. See K. Kopecki and associates, op. cit.

5. A table of conversion factors used earlier and those now in use is given in Appendix 1.

6. Attention should be paid to the author's term "rational streamlining" and the terms "conservation" and "economizing" because economizing, especially if it is forced, is not always rational; at times, it leads to excessive socioeconomic losses.

7. This is a part of resources that can be technically and economically utilized in light of existing and feasible methods. In coal, such resources are very small (6 percent) in relation to enormous coal resources (10 billion 126 million tons standard fuel, nearly a half of which is in the Soviet Union).

8. Following K. Kopecki, it is being assumed now that over the long term requirement growth will not be exponential.

9. It is worth noting in this connection that in the author's opinion solar energy facilities located in well insolated areas can become perform for some underdeveloped countries the former and present role of crude oil.

10. This method has been developed by the author part on the basis of the WAES research team from the MIT and was employed in the experts' report with regard to economic branches and rather than products. It's being fully employed now in the work conducted by docent W. Bojarski in the PAN IPPT [Polish Academy of Sciences Institute of Basic Problems of Technology] Energy Problems Department.

CSO: 2600

BRIEFS

JOINT COMPANY WITH NIGERIA--Council of State Decree No 50 of 23 February 1980 has approved the participation of the Romanian Construction-Installation Enterprise--ARCOM, with headquarters in Bucharest, subordinate to the Ministry of Industrial Construction, in the establishment, with the Inaolaji Builders Ltd Firm, of the "ARCOM (Nigeria) Ltd" joint construction company, with headquarters in the city of Ibadan in the Federal Republic of Nigeria. The share of the participation of the Romanian Construction-Installation Enterprise--ARCOM is 40 percent of the social capital of the company. [Text] [Bucharest BULETINUL OFICIAL in Romanian Part I, No 22, 17 Mar 80 p 2]

CSO: 2700 END

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